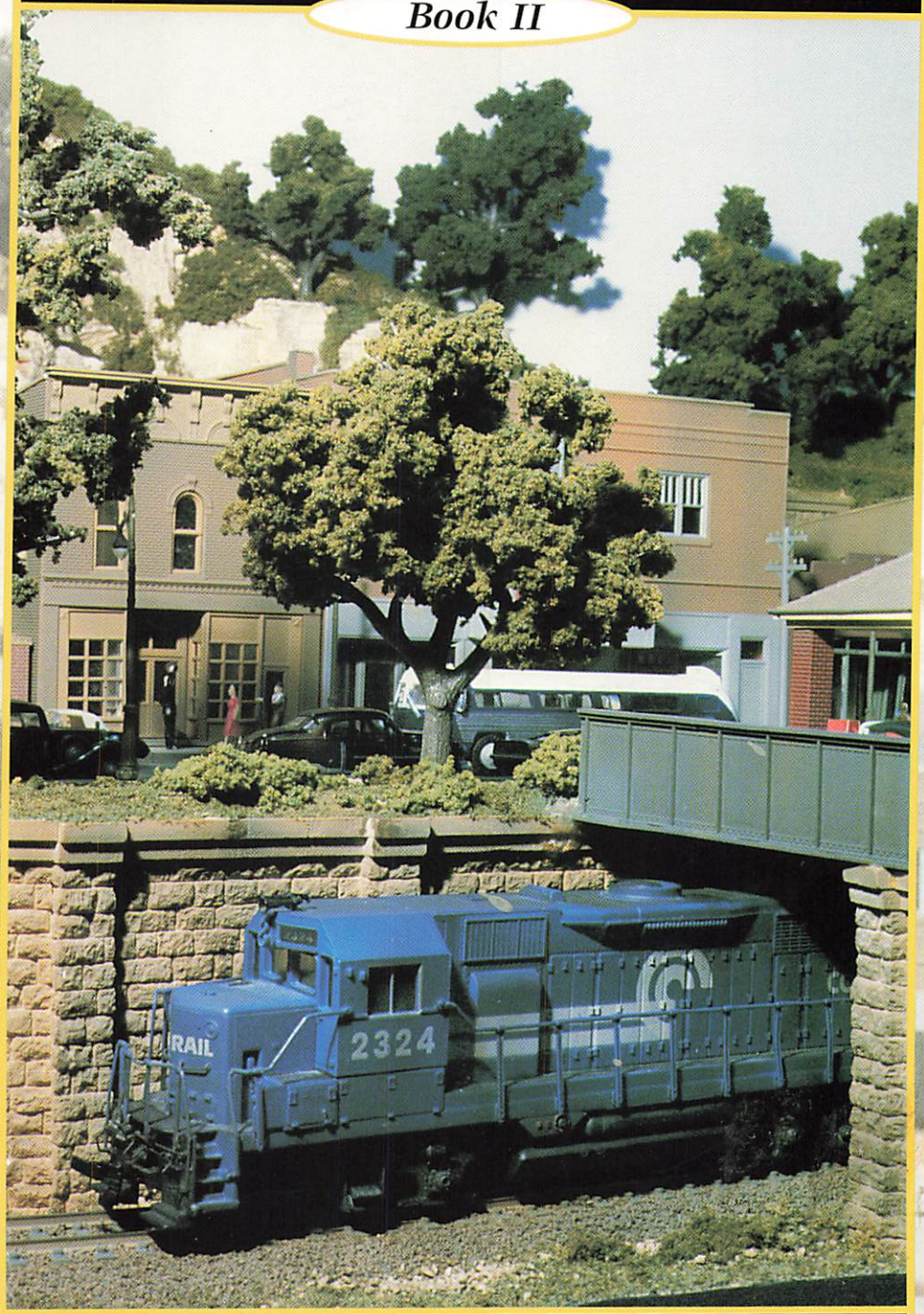
MODEL RAILROADING MADE "E-Z" WITH BACHMANN'S E-Z TRACK® SYSTEM

Book II



By Robert Schleicher

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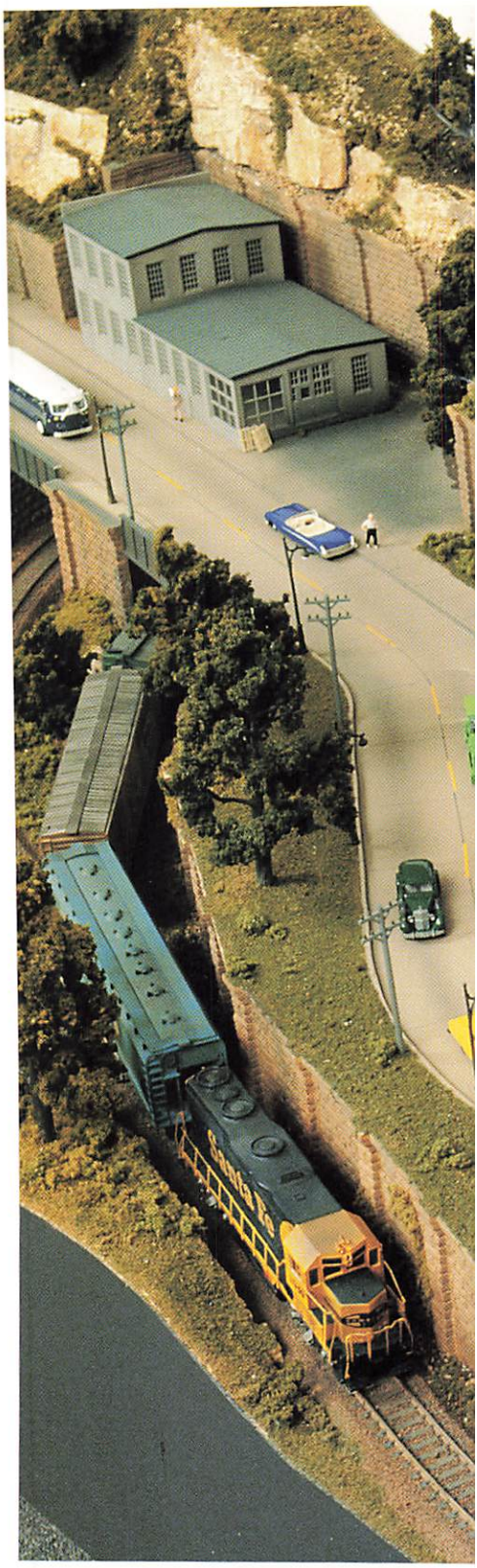

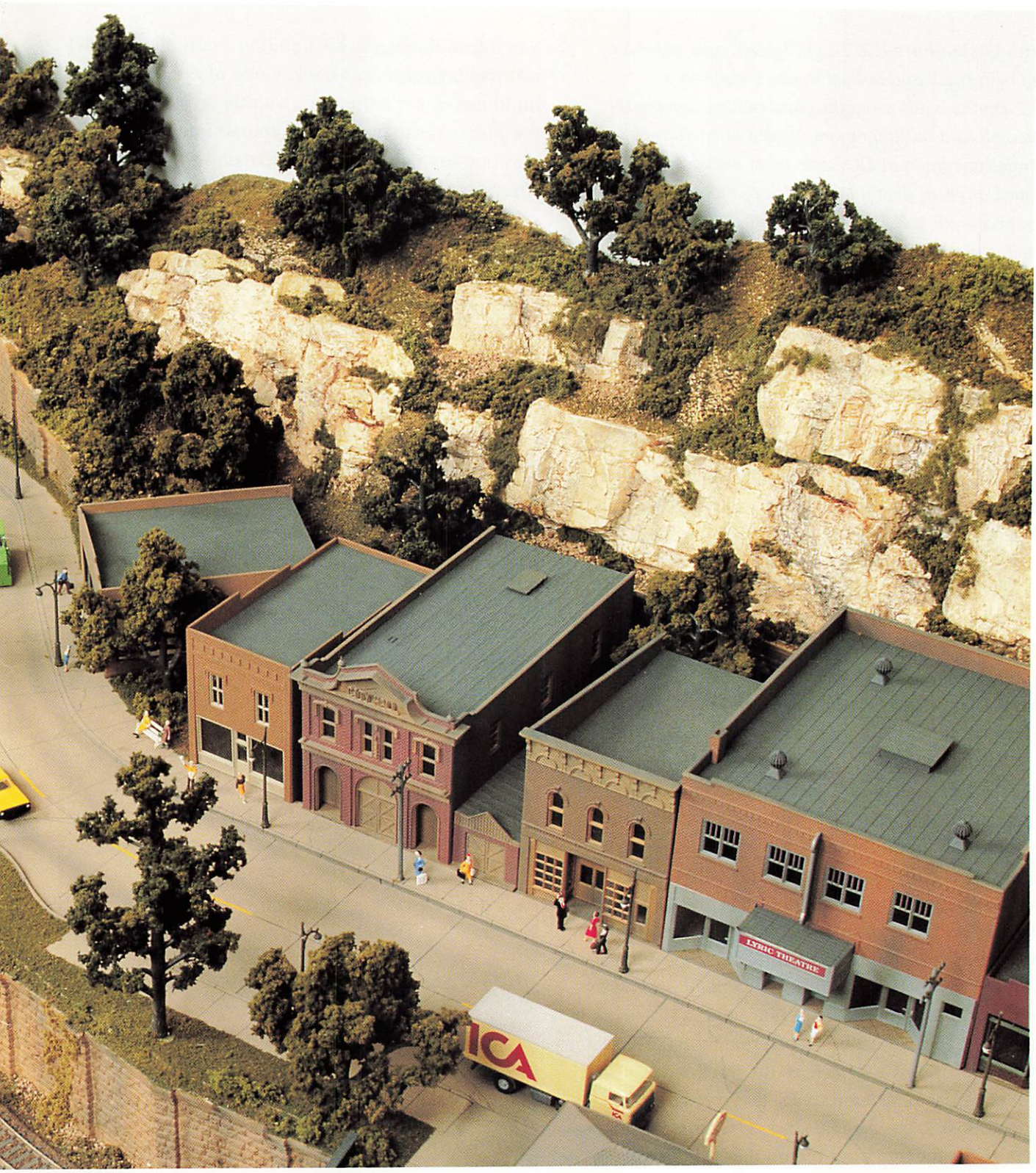
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Chapter I

The Bachmann E-Z Track® System

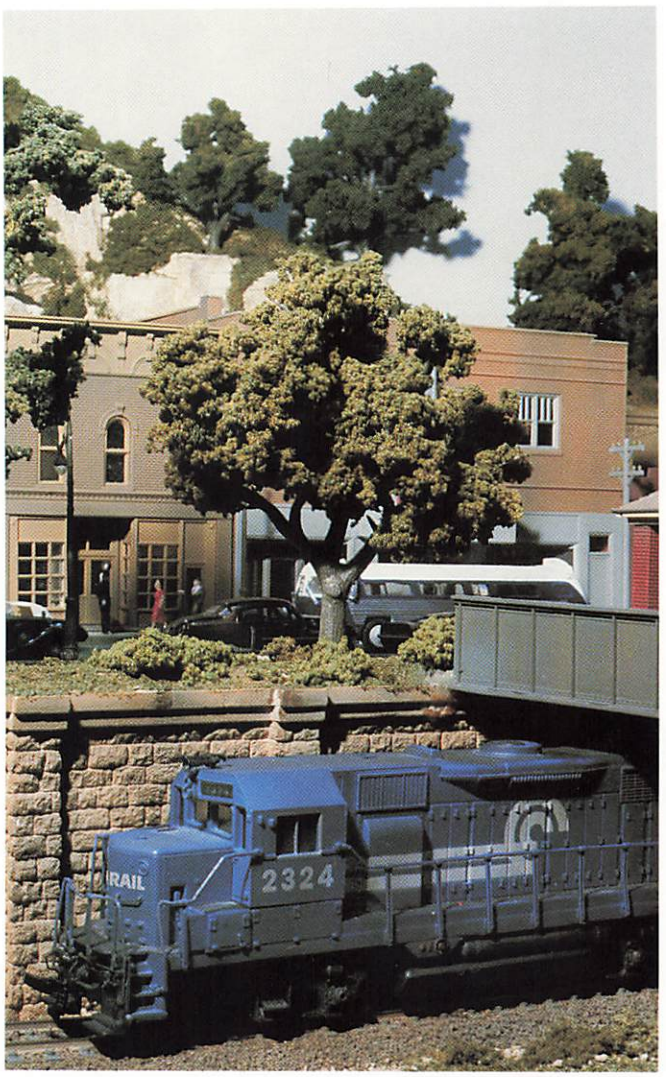
With Bachmann's E-Z Track® System, you can now lay both track and ballast in one simple step. E-Z Track's built-in roadbed and ballast provide the strength and self-alignment needed at each track joint. While conventional HO scale track was designed to be nailed or glued firmly to a tabletop, those steps are optional with E-Z Track. Layouts where the track itself is movable are described in the book MODEL RAILROADING MADE "E-Z" WITH BACHMANN'S E-Z TRACK SYSTEM (Book I). In this book, (Book II), we describe how to create permanently glued and nailed E-Z Track layouts, and how to create permanent scenery.

Your First Model Railroad

If this is your first model railroad, we suggest that you build the basic benchwork and place E-Z Track on the tabletop, but do not, yet, nail or glue it into place. Try several of the different track plans in this book and operate your trains for a while. (With E-Z Track you can do this without nailing or gluing the track to the table.) When you are fully satisfied that you have found the best plan for your use, then proceed to mark the location of the track and cut the plywood tabletop as shown in Chapters II, IV and V.

Don't be discouraged if your first attempt at a finished model railroad is not quite as perfect as what is shown on these pages. This particular layout was built by Lunde Studios who specializes in custom-building model railroads and dioramas. We directed them to use the simplest techniques possible to make it easy to duplicate their efforts. Most of the techniques used have been proven by tens of thousands of model railroaders. However, it certainly does take a bit of practice to make a neat corner joint in wood, to wire the track for multiple train operation, to stain rocks, to apply ground foam texture so it looks like real grass, to weather structures and to master the other techniques demonstrated.

You'll find the basics for building a complete model railroad layout in this book. None of the scenery or buildings or even the track on this layout is *completely* permanent. Give yourself permission to tear out any parts you don't like and start over. That's exactly what an experienced model railroader would do. In fact, we even did some tearing out and rebuilding on this very layout. *It's all part of the fun of model railroading...and it really is easy!*



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Chapter II

Try-it-First Track Planning

The strength and self-aligning features of E-Z Track make it possible for you to try a number of different track plans before settling on the one that suits you best. With conventional track, you'd need to nail or glue the track in place for reliable operation. The only reason to attach E-Z Track permanently to a tabletop is so that it won't work itself away from surrounding scenery. You can, then, try any or all of the track plans in this chapter in a single 4 x 6 foot area. Or you can modify them to suit yourself.

Tabletop or Shelf-Style Layouts

Each of the following layouts can be built on a simple 4 x 6 foot tabletop or on a pair of two-foot wide shelves. The advantage of the tabletop is that you can operate the trains on an endless run around the oval that is part of each of these plans.

On a shelf-style layout, you can only run the trains back and forth to perform switching moves where the locomotive moves just a car or two at at time in and out of industrial sidings or yard tracks. The upper two feet of Plan 2 (see page 10) and the lower two-feet of Plan 3 (see page 10) both have interesting operations as switching layouts.

You can use the shelf concept to store a 4 x 6 foot layout if you do not have space to permanently leave it in a room. Simply build the layout, as we did, as two 2 x 6 foot pieces that bolt together in the middle. When you want to store the layout, unbolt the two halves and store them on heavy-duty shelf brackets or legs. There's usually space in a den or spare bedroom closet for a couple of two foot sections, especially if they can be stacked on top of each other by use of standard shelves or shelf brackets.

Each of the three plans in this book begins with a simple oval. Note, however, that each oval has its own unique shape to allow the track to be expanded into the more complex plan without relocating any of the original track. In some cases, a piece or two of track must be removed so a switch or crossing can be installed in its place. We would recommend, though, that you install all of the track on the plan (as well as any additions you want) before starting the scenery construction.

A Bigger Layout

The layout that we built to illustrate this book incorporates nearly all the steps you will need to build a model railroad of any size. If you have more space, you can certainly expand any of these track plans in any direction by simply inserting pairs of straight tracks on opposite sides of the plan. All of these plans can be expanded, for example, to fill a standard 4 x 8 foot sheet of plywood. The 4 x 6 foot size is small enough, however, so you can place it over a double bed during operating sessions. If the layout has removable scenery, you can even store it beneath that double bed.

Plan 1, The Mainline Railroad

This track plan is designed for the model railroader who wants to simulate a prototype railroad with relatively heavy double-track mainline operation. There's certainly no room on a layout this size for 100 car trains, but you can certainly operate six- or seven-car freights and three- or four-car passenger trains. Imagine that each car represents 10 or 12 cars on the real railroad. It is common for real railroads to include "blocks" of several nearly-identical cars heading to or from a single shipper or terminal yard. You can simulate those blocks with a single car.

This layout would be most interesting to operate with one mainline train circling the outer oval.

A second train could be made up or broken down in the yard. Park the second train's cars on the left side of the inner oval and the second train's locomotive at E. Use a third locomotive to change the makeup of the train using the yard tracks and the left side of the inner oval. When the train is ready to leave, park the switcher locomotive at D and bring the mainline locomotive on around so the train can resume its route around the inner oval.

Plan 2, The Long Haul Line

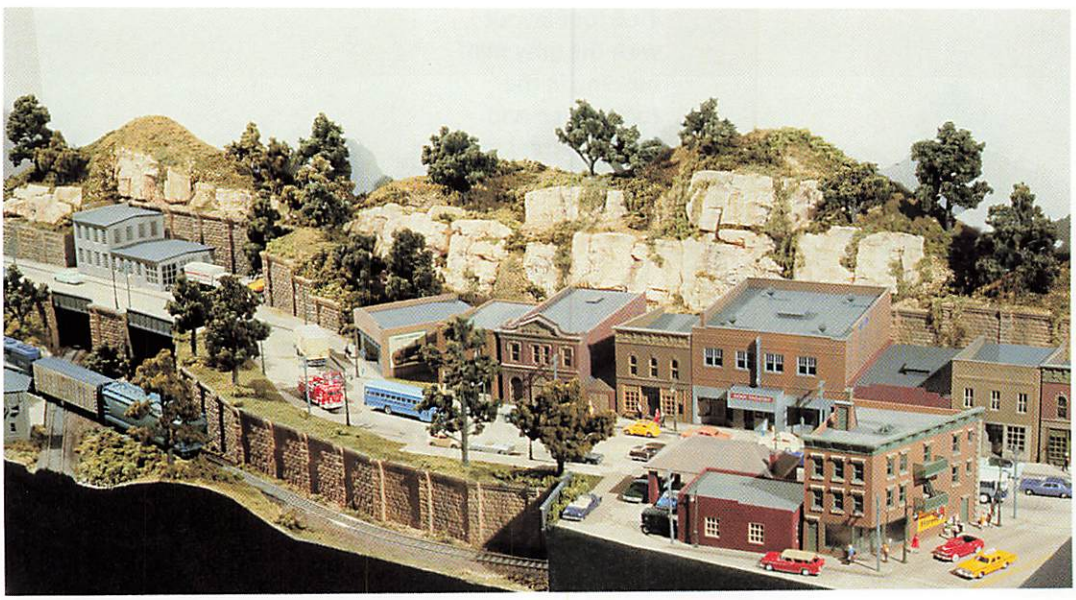
This plan provides the longest possible run for a train by making two full laps of the 4 x 6 foot area. It is really an inverted figure 8. The short connecting track above the 30 degree crossing can be used to provide a shorter route. A possible real world scenario would be that two railroads share the trackage over the outer oval. That provides an excuse to run different real railroad locomotives at the head of the train on different "days" (the "days" can be only an hour long, if you'd like.) There are three sidings that can be used to store or "park" a second locomotive or to simulate different towns along the railroad.

Plan 3, The Wayfreight Route

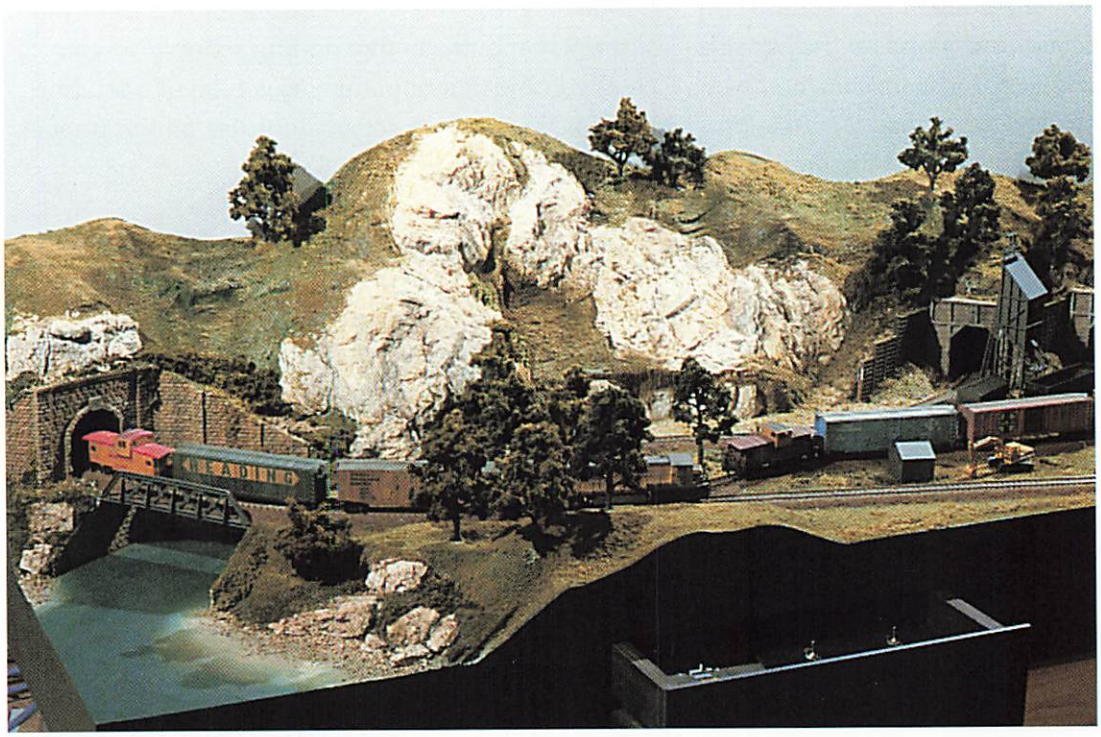
This plan is designed for the experienced model railroader who has operated long enough to understand and desire the complexities of switching operations. If this is your first layout, we would suggest you try operating on this track plan for a few months before adding scenery so you really know that you enjoy this type of operation. This is the plan we selected for use on the project layout illustrated in this book.

The plan has an outer oval that serves as the mainline with a passing siding at A-E-D. There's a small town on that side of the layout to serve a very active ore mine. Carloads of ore are loaded at the mine and shipped around the mainline to the mill above C-B on the opposite side of the layout. There's more information on the operations of pushing empty cars into the mine and pulling loaded ones out in Chapter XV. There is room for another industry at C and above A on the bottom side of the layout. On a real railroad, trains that drop off or pick up cars at industries along their route are called wayfreights or peddler freights.

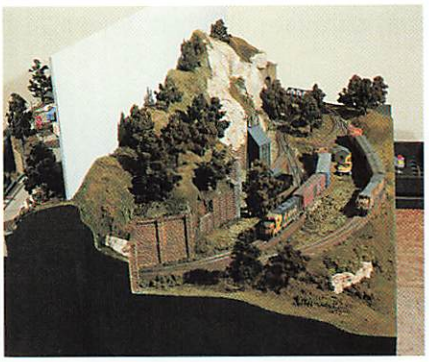
The crossing near B simulates a connection with a second real railroad. Cars destined for points beyond the layout can be removed from the layout by hand at the crossing. Cars coming in from the outside world can be put on the layout at the crossing. There's also more information on these types of "interchange" operations in Chapter XV.



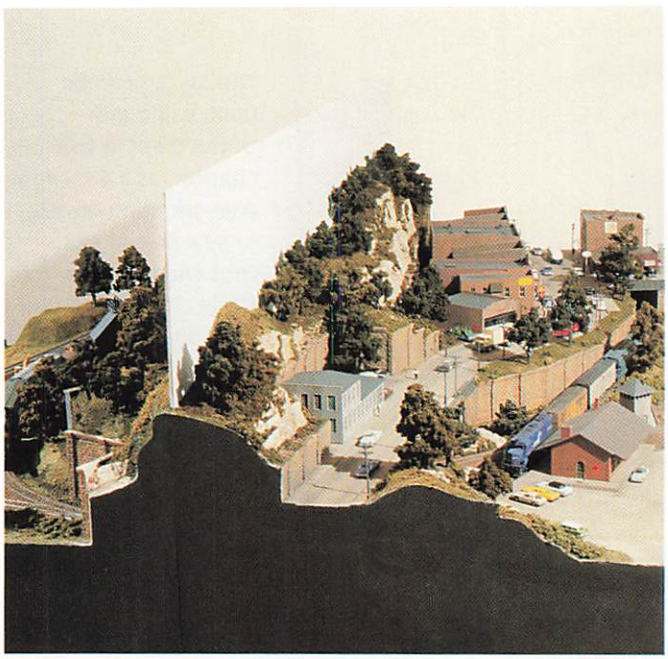
This layout can be built, using any of the plans in this chapter, as a 4 x 6-foot free-standing layout, or as a pair of two foot wide shelves. This is the city scene using track Plan 2.



A view of the country and mine side of the layout using Plan 2. This scene is joined, back-to-back, with the city scene to produce a 4 x 6 foot layout.

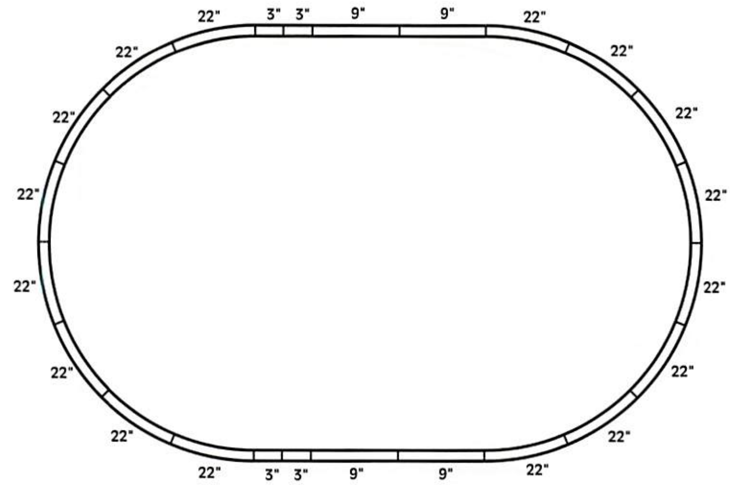


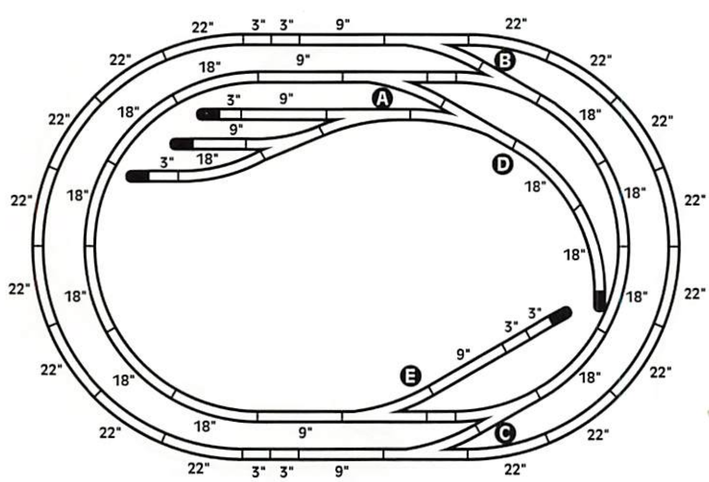
The view from the end of the 4 x 6 foot layout with the country scene on the left and the city scene just visible on the right. The two tracks on either side of the mine lead beneath the scenery to the grey mill on the city scene.



The view from the end of the 4 x 6 foot layout with the grey mill building in the foreground and the city street in the background.

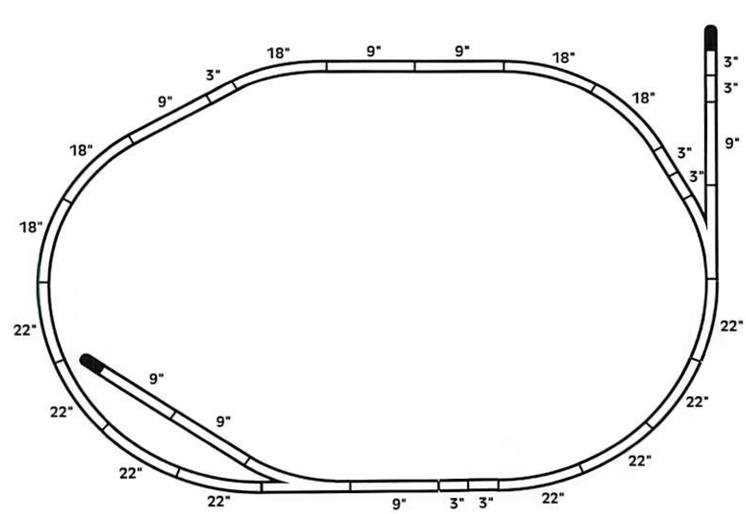
Each of our three track plans can be started with a simple oval. Plan 1 begins as an oval with 22-inch radius curve sections around both ends.

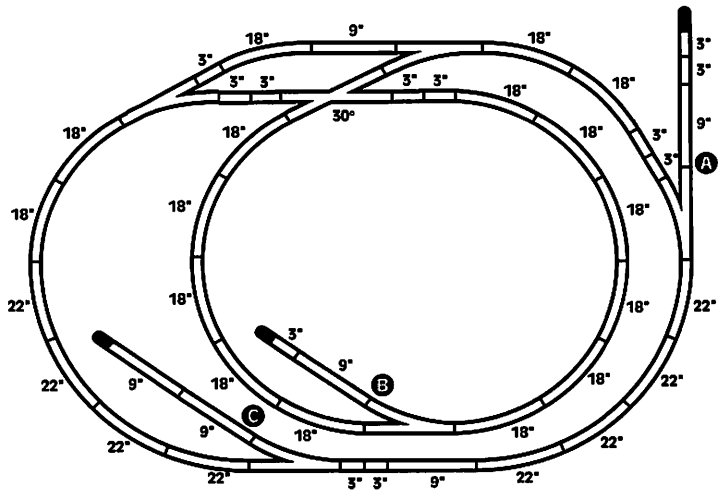




PLAN 1. A second oval, with 18 inch radius curved track sections, has been added inside the first oval and a small yard inside that. A second spur at E could serve another town. The letters identify places where insulated gaps or plastic rail joiners and additional electrical connections must be made as described in Chapter VI.

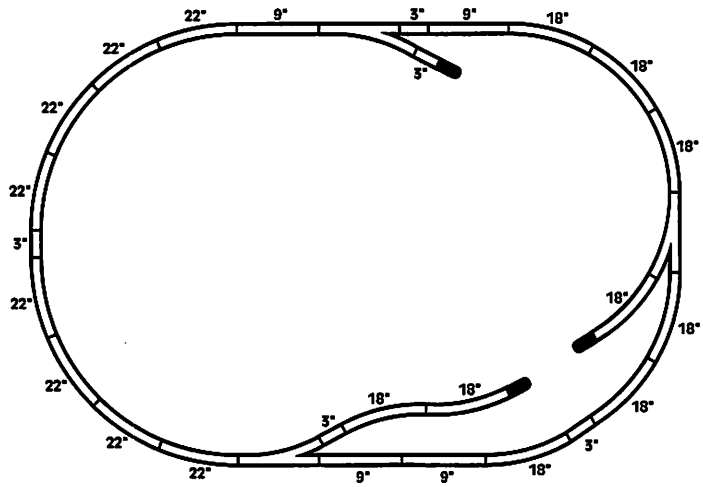
The egg shape of the basic oval that will become Plan 2 has two quarter circles of 22 inch radius curved track along the lower edge and two industrial sidings.

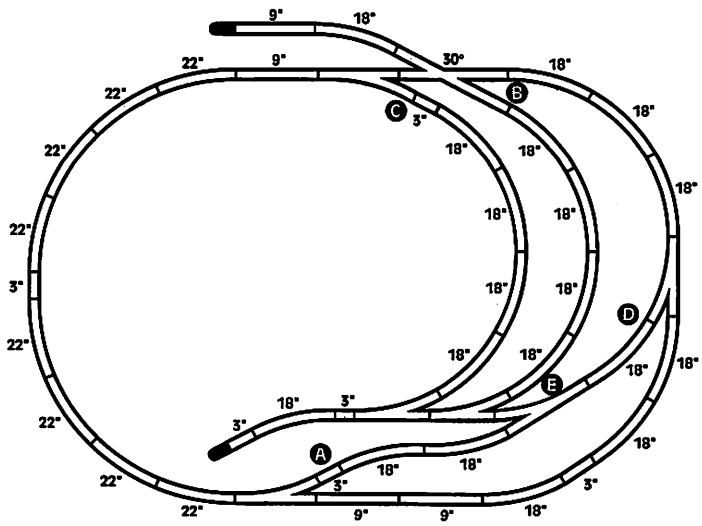




PLAN 2.
This is really an inverted figure 8 with 22 inch radius curves at both ends, three industrial sidings, plus a shortcut above the 30 degree crossing.

This squared oval has 22 inch radius curves on the left and, for this starter layout, three stub-ended sidings.





PLAN 3.
This plan is designed for switching operations. The oval mainline has a passing siding at A-E-D. Tracks C and B are "loads-in, empties-out" tracks for the operations described in Chapter XV.

Chapter III

Building Wood Benchwork

The array of wood braces that create the latticework-like table that supports the track above the floor is called "benchwork" by model railroaders.

If you are merely creating a flat city or industrial scene, you can use a simple piece of 3/4 inch thick plywood and your choice of legs. If you are building a layout with scenery that extends both above and below the tracks, however, it's wise to build a latticework of braces in what modelers call an "open grid" pattern. The open grid provides the bare minimum of support for the track with as few cross members as possible. The open grid reduces the weight of the benchwork because the finished benchwork provides solid surfaces only beneath the buildings, the flat water surfaces and the trackwork.

The Professional Approach

There is only enough space in this book to provide a rough outline of benchwork construction. If you need more information, most hobby shops sell books devoted to benchwork and layout construction. If you lack experience working with wood, you can show this book to a carpenter and he or she can certainly build the basic benchwork for you to match the photographs.

Building the Open-Grid Benchwork

We would suggest you build the benchwork for this 4 x 6 foot layout in two halves, each 2 x 6 feet. The two-piece construction allows you to store individual halves of the layout on 73-inch long book shelves, and it is much easier to move or pack 2 x 6 feet sections if you must relocate to a new home.

Build the basic open grid benchwork from 6-inch high pieces of 1/2 inch plywood. Cut the plywood to form two boxes, each with a 24 x 72 inch INSIDE dimension (so the overall size of each box is 25 x 73 inches). Use 1 x 3 lumber placed on edge for cross braces as shown in the photographs. Recess the 1 x 3s 1/2 inch below the top edges of the 6 inch plywood boxes. Use simple butt joints assembled with number 8 x 1-1/2 inch wood screws. Buy a pilot bit for your electric drill and pre-drill the holes for the wood screws. The pilot bit will help prevent splitting the wood.

Add some foot-long 1 x 2 braces, recessed 1/2 inch, along the inside of the plywood. Cut a piece of 1/2 inch plywood 24 x 72 inches to fit inside the 1/2 x 6 inch plywood edges.

(This layout was actually assembled from a laminate of 3/4 inch plywood because it was designed to be shipped around the country for display at trade shows. Also, Lunde Designs, the builders, used their cabinet shop techniques to miter each of the corner joints. Don't, then, expect your finished benchwork to look as heavy or as neat as that in the photographs.)

The Two-Piece Shelf-Layout Option

Join the two 25 x 73 inch boxes using 1/4 inch dowels and 1-1/2 inch carriage bolts, flat washers and nuts. The dowels will help align the two halves while the carriage bolts provide the clamping force when the halves are assembled. Later, when you lay the trackwork, shift the entire finished trackwork an inch or so to be certain no actual track joints fall across the seam between the two halves of the layout. After the track is glued and nailed firmly to the benchwork, use a razor saw to cut through the rails and ballast along the seams between the two halves of the layout.

When you cut through the track with a razor saw you will, of course, break the electrical continuity through the rails. To be able to conveniently

restore electrical continuity, install 12-inch long 18 to 22-gauge insulated electrical wires to each of the cut rails. Solder the wires directly to the rails, then install a two-pin electrical plug and socket for each pair of wires from an electronics hobby store like Radio Shack. There are a variety of light-duty connectors available for this purpose. Cut the wires and insert the electrical plugs and sockets. Be sure to mark or color code the sockets so you do not accidentally connect the wires from opposite rails. These connectors must be plugged and unplugged whenever you assemble and disassemble the two-section 4 x 6 foot layout.

The Supporting Legs

Add foot-long 1 x 4 diagonal corner braces butted against the bottom of the 1 x 3s as shown in the photograph. We selected common 4 inch PVC pipe for the legs. Home supply dealers carry the pipe as well as interior caps (that can be used for mounting brackets) and end caps. Have the dealer cut the legs to the exact length you need and thread both top and bottom. When the layout is completed, paint the legs flat black.

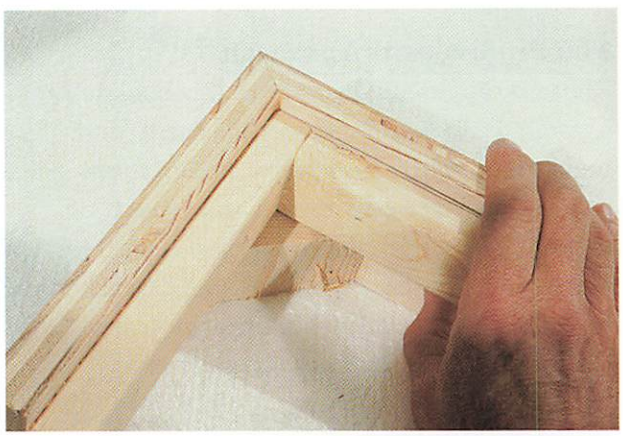
Profiles for Hills and Valleys

We knew we wanted hills along the 73 inch center of the layout so we used a saber saw to cut some rough profiles of hills from leftover 1/2-inch plywood and cemented them to the edges of the benchwork.

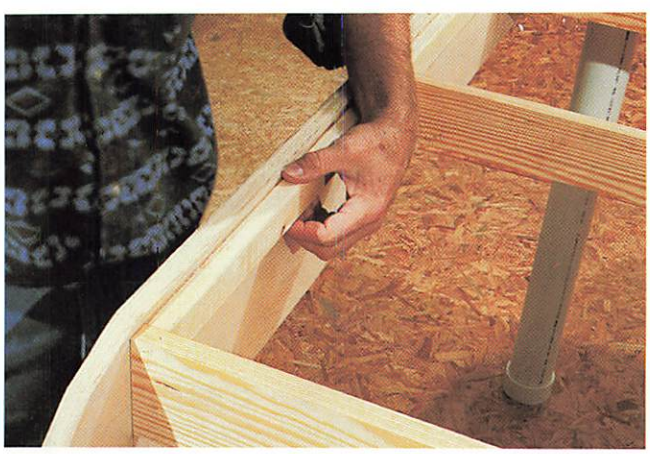
We also removed some of the plywood benchwork edges in places where we knew there would be streams or rivers. You must do some very careful preplanning and have previous layout building experience, however, to make such bold cuts this early in the process. It would be best to leave the table edges alone until you have finalized both the track plan and the scenery shapes.

A Bookcase for the Shelf Layouts

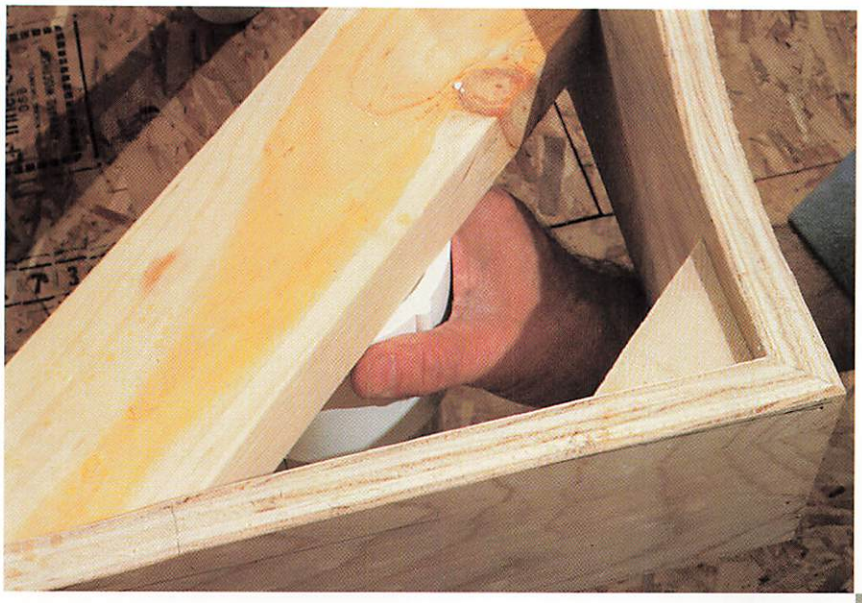
If you are going to disassemble the layout to store it as two 2 x 6 foot pieces, you can construct a simple wooden storage bookcase. Use 2 x 4 lumber to build the "bookcase," with four vertical 2 x 4s, and two 73 inch long shelves, one about three feet from the floor and a second about 4 1/2 feet from the floor. Use 2 x 4s for the shelves and for three two-foot horizontal cross braces. It would be wise to attach a plywood back above the bottom shelf to act as a diagonal brace. The two halves of the layout can be rested on these shelves with legs removed for storage.



A typical corner at the edges of the exterior plywood box. You can use a simple butt joint, rather than this miter joint, however.



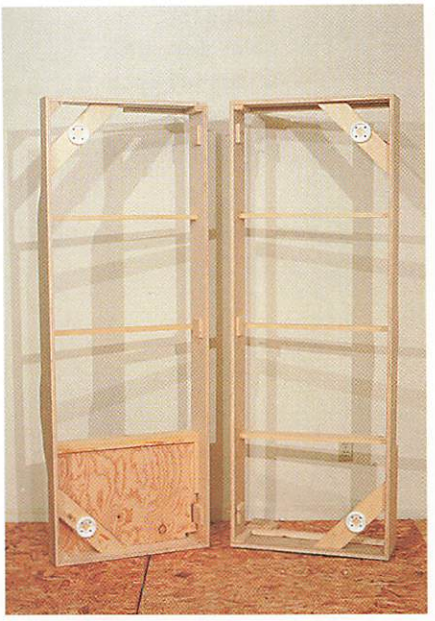
Glue 1 x 2s inside the plywood frame (to support the 1/2 inch plywood tabletop flush with the top of the exterior frame).



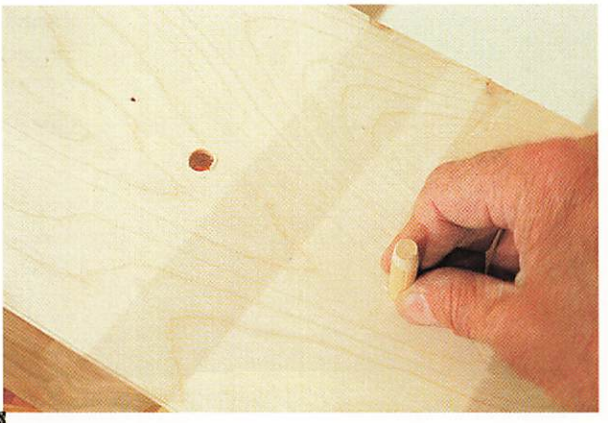
Attach foot-long 1 x 4s diagonally across the bottom of each corner to support the legs.

Use 4 inch PVC pipe for the legs. Use number 8 x 1 inch wood screws to attach the interior caps as mounting brackets.

Have a lumber yard cut the 4 inch PVC pipe legs to the length you want and ask them to thread the end, of each leg. Cover the bottom ends with PVC pipe caps. Screw the legs onto the interior caps you attached to the benchwork.

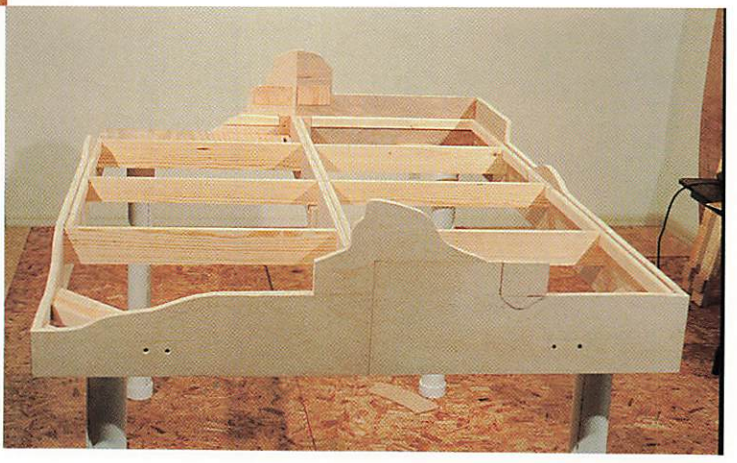


The finished open grid benchwork with 1 x 3 interior braces. A sheet of plywood covers one end where the bottom of a lake will rest.



If you decide to make the 4 x 6 foot layout in two 2 x 6 foot halves, join the halves with 1/4 inch dowels and 1/4 inch carriage bolts, flat washers ad nuts.

If you are certain of the locations of rivers, valleys and mountains, go ahead and cut them into the sides of the layout with a saber saw.



The open grid benchwork is now ready for the 1/2 inch plywood tabletop. The mountain-shaped plywood profiles will support both mountains and the sky backdrop.

Chapter IV

Tabletop Layout Construction

Start this layout on a simple flat tabletop. This will provide the opportunity to experiment with different track layouts before you decide on a permanent trackwork design. One of the advantages of E-Z Track is that it offers you that option. You can lay the track loosely on the tabletop and run trains for months with no need to glue or nail the track in place. Read the suggestions in Chapters II and XV about train operation and try them. When you are completely satisfied that you've found the track plan of your dreams, then give and/or nail the track in place and begin work on the scenery. If you have decided on dividing a 4 x 6 foot tabletop into two 2 x 6 foot shelf-style layouts (like the project layout in this book) be sure to shift (or slightly rotate) the entire track layout on the tabletop just enough so any joints between track sections are at least an inch away from the split between the two shelves, then nail down the track.

Setting the Scenery & Structures

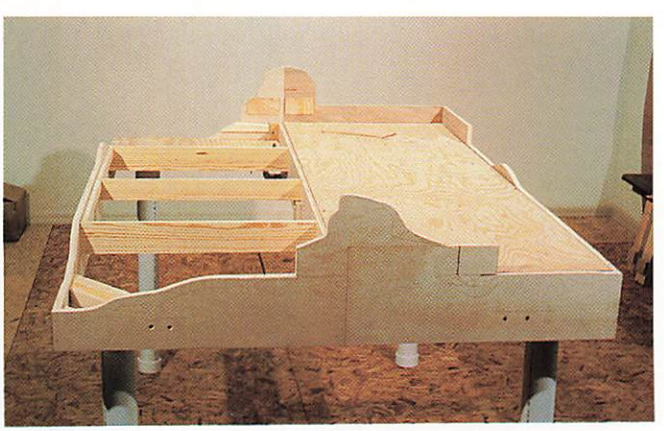
Decide, now, where you will most likely want to place buildings, roads, rivers, streams, bridges, valleys, hills, tunnels and all other major scenic features. You will want to remove portions of the plywood tabletop from most areas that will be inside mountains or that will be covered by steams or valleys. Lunde Studios selected the scenic treatment for this layout. The "city" scene is located above the tracks on the top of Plan 3, where there is relatively little track. You could use the same scenic treatment for Plan 1 or Plan 2 with the "City" scene above the tracks on the bottom of each of those plans.

Preparing the Right Of Way

Once you are satisfied with the track locations, mark the edges of all the tracks (the right of way), the track joints, and the sites for any buildings or roads that will be at track level. Also mark the locations of bridges and bridge abutments so you can remove the plywood from those areas.

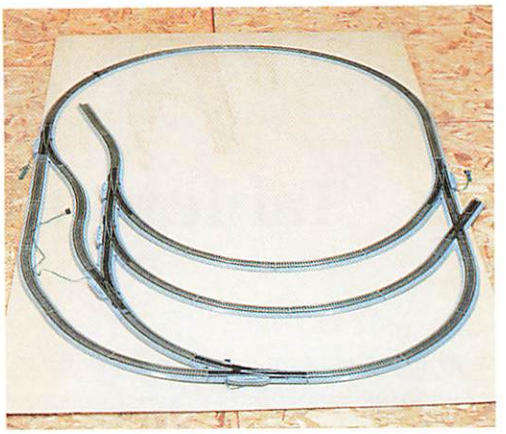
Use a saber saw to remove the plywood from all other areas of the layout. Use a 3/8-inch drill bit to provide a starter hole for the saber saw blade if you need to make interior cuts, for perhaps a hollow for a small lake or gully. If you have solid plywood under the interior of tunnels, provide access hatches as shown in the photograph so you can reach in to remove derailed cars or locomotives from the tracks.

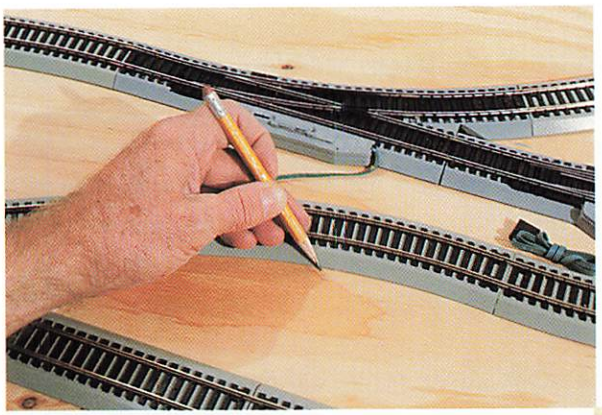
When you have removed all the plywood except that which will support the railroad right of way, roads, buildings and abutments, attach the plywood to the 1 x 3 cross members and, where possible, to the 1 x 2 braces along the interior edges of the plywood frame. Use number 8 x 1 inch wood screws. Seal the plywood and all the open grid benchwork with at least one coat of clear varnish, and let it dry thoroughly before installing the track.



Fit, *but do not secure*, the two 24 x 72 inch pieces of 1/2 inch plywood inside the plywood open grid framework.

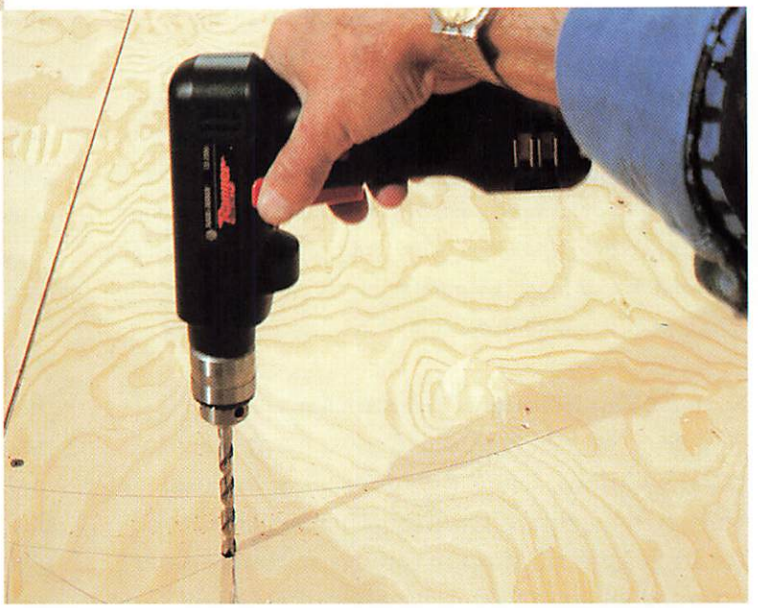
You can rearrange the E-Z Track sections on the tabletop, or move the tabletop to the floor to get a "birds eye" view of the track plan.

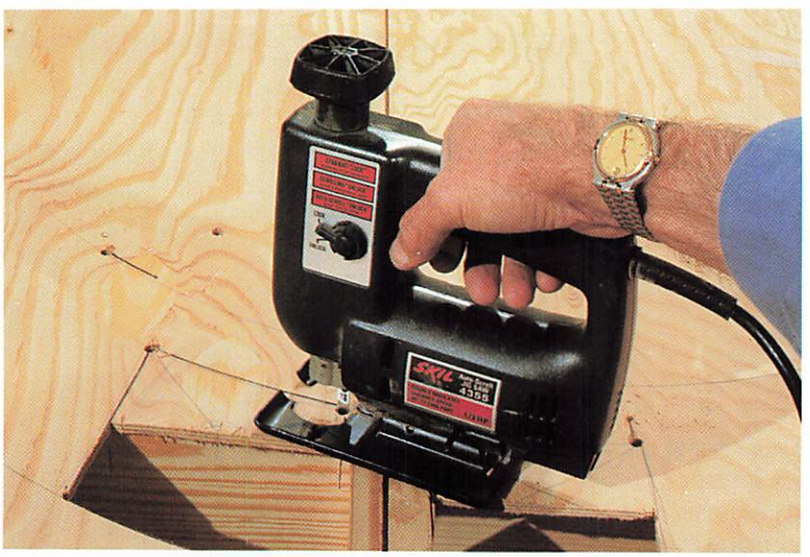




When you are completely satisfied with the track plan, mark the edges of all the track sections and the locations of the track joints on the plywood.

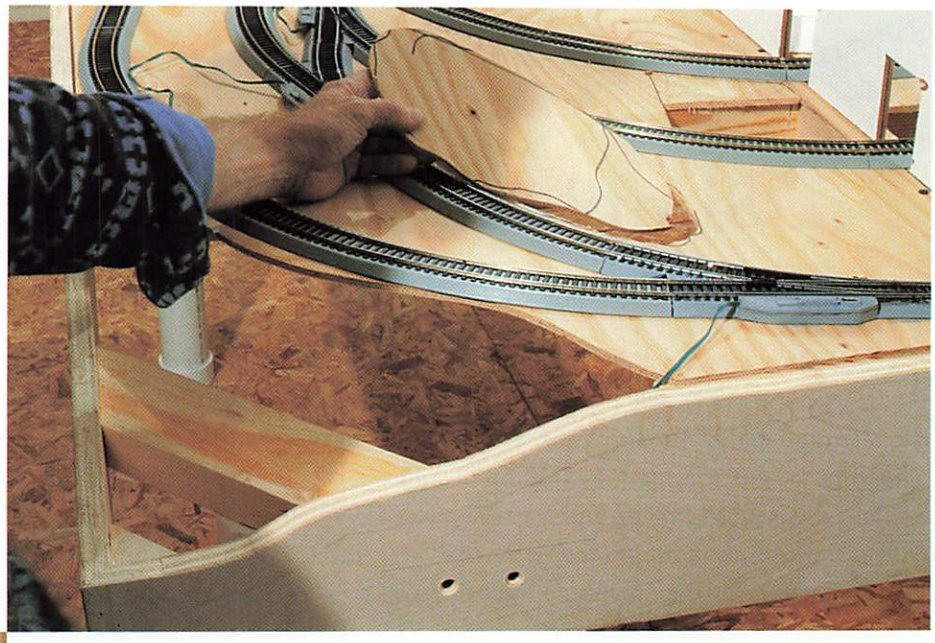
Mark all the areas you want to remove with pencil lines. Drill a 3/8 inch hole on the pencil line to provide a starting place for the saber saw blade.

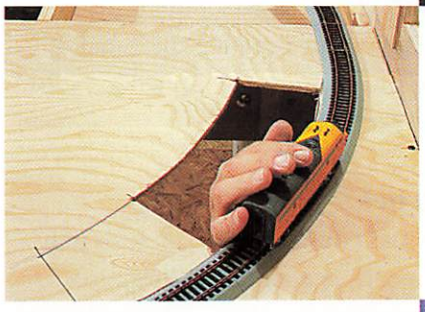




Cut along the pencil lines with a saber saw.

The tracks cross this area on a "fill" or embankment so there is a valley in the foreground and this small gully behind the tracks.

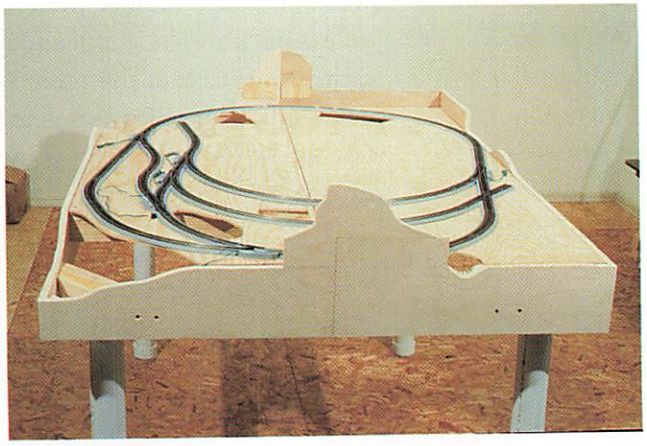




Be sure to cut access hatches through the plywood tabletop so you can reach any derailed trains that will later be inside tunnels.

Use number 8 x 1 inch screws to attach the 1/2 inch plywood to the benchwork cross members.

Follow the pencil marks and replace the trackwork in its final position, ready to be glued and nailed in place.



Chapter V

Simple Super-Detailed Track

E-Z Track provides the realism you want for your model railroad track. The rails, ties and ballast shape are already molded into the track and are ready to use. The track is also self-aligning and it will stay together without the need to glue or nail it to the benchwork. However, for a permanent model railroad, it is still best to fasten E-Z Track firmly to the benchwork.

Mounting E-Z Track

We have found it easiest to install E-Z Track with a combination of Liquid Nails and number 17 x 3/4 inch metal nails. The track can shift a bit in the Liquid Nails to introduce some slight misalignment at the track joints. However, you can insert a nail in the pre-drilled holes in the ballast on the switches to prevent the track from shifting. You can also install a nail in a curve or straight by using a 1/32 inch bit in an electric drill to drill a hole through the center tie and down through the E-Z Track ballast. When you hammer in the nails, put a piece of business card against the nail as a spacer to keep the nail from being driven in so far that it distorts the track. There should be just a bit of clearance between the bottom of the nail head and the top of the tie.

Run a *thin* bead (1/8 - inch diameter) of Liquid Nails along the pencil lines you drew earlier to indicate the edges of the track. DO NOT, however, apply any Liquid Nails to the areas where the switches will rest—-use the nails to hold the switches. Push the track into the still-wet Liquid Nails and hold it down with a few weights (cans of paint are fine weights for this purpose). When the Liquid Nails dries, the track will be held firmly.

Track Relocation Techniques

If you use a *thin* bead of Liquid Nails and an occasional nail, the E-Z Track will be held firmly in place, but it can still be removed if you wish. You might want to remove a switch for maintenance, or to remove a section of track to add a new switch or make some other changes after the layout is "finished." To do this, simply insert a large paint spatula between the bottom of the E-Z Track ballast and the plywood. Wiggle the spatula around until you have broken all the glue joints and pry upward slightly. If the track is also nailed, use diagonal cutters to grip (but not cut) the head of the nail so you can pull it from the plywood before removing the track section.

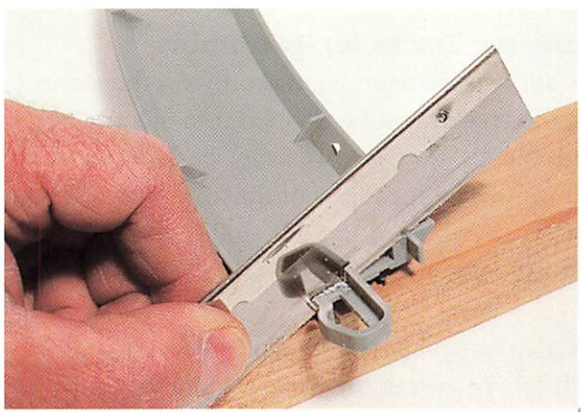
Removable Switches

There are moving parts at each E-Z Track switch that are located beneath the ballast. When you attach the track permanently, those parts will not be accessible. For a permanent model railroad, it is wise to make a provision so each turnout (switch) can be removed. Use a razor saw to cut just the large hook-shaped connectors from the plastic ballast. You can then wiggle the switch directly between the permanently mounted adjacent track sections. The small tabs on the ends of the ballast will help align the track.

The rail joiners must also be loosened with a small screwdriver and slid back on the rails so you can remove the switch. When you replace the switch, use needlenose pliers to slide the rail joiners back in place and squeeze them tightly against the sides of the rails. You might want to make similar modifications to any piece of track that you think you might want to remove later to replace it with a switch.

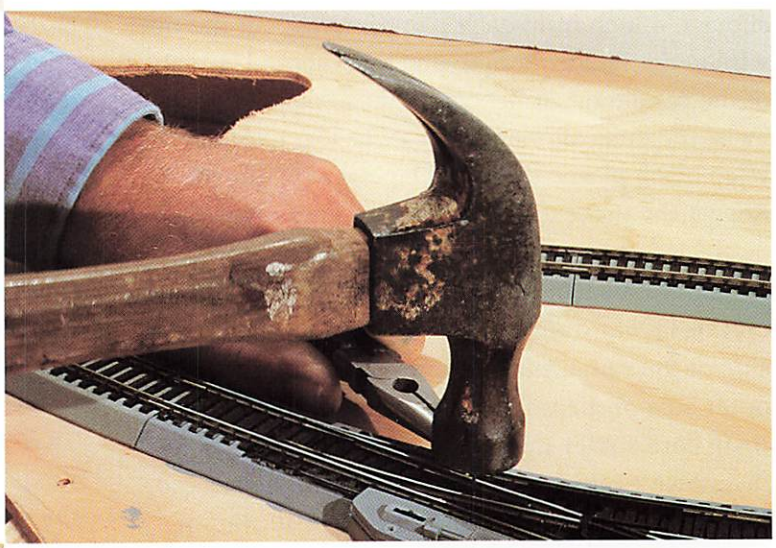
Glue the E-Z Track to the plywood with two thin beads of Liquid Nails.

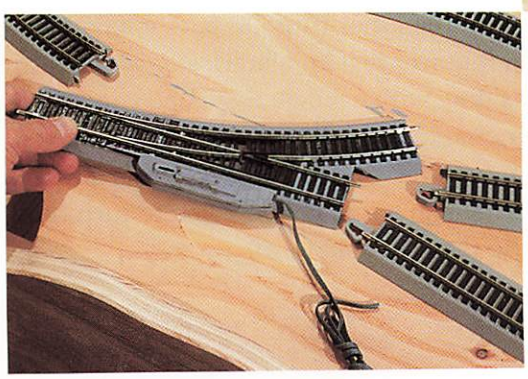
Hold the tracks in the still-wet Liquid Nails with a few cans of paint as weights.



To make the switches removable, cut off the large hook-shaped connectors with a razor saw.

Install a number 17 x 3/4 inch nail in most switches to keep the track from shifting in any still-wet Liquid Nails.





The switch can be settled into place with the small aligning tabs holding the ballast in alignment. A nail must be used, though, to hold the switch.

Chapter VI

The Plug-In Wiring System

The wiring system for E-Z Track is a simple plug-in, two-wire cable to provide power to the track, and a second two-wire cable to provide power for the switches. Those cables plug into the special terminal track sections and the Switch Control Boxes (that provide push button remote control for the switches). The remote control switches themselves have three-wire cables to connect to plug-in terminals on the Switch Control Boxes. That's all there is to it.

On some layouts, you may need longer wires. Hobby shops and some hardware stores sell number 20 or 22 gauge stranded and insulated copper wire. Splice the needed additional length of this two-wire cable into the E-Z Track cables. To splice the wires cut the E-Z Track cable about an inch from one of the plugs. Strip the insulation back about 1/4-inch from each pair of wires. Cut the new wire to the needed length and strip about 1/4-inch of the insulation from each of those pairs of wires. Twist the ends of one pair of wires together and wrap black plastic electrical tape around the joint. Repeat the process with all of the remaining wires.

We did not use an E-Z Track plug-in terminal track on this layout; rather, each wire is soldered to the side of the rail. Carefully scrape the hollow on the outer side of the rail to remove any oxides. Use rosin core solder intended for electronic work (available from some hobby shops and electronic hobby stores like Radio Shack). Use a 40 watt or larger soldering gun or iron. Hold the stripped bare wire into the hollow of the rail. Heat the rail and gently push the solder against the rail, not the tip of the iron or gun, until it melts. Remove the iron or gun the instant the solder begins to melt, but hold the wire until the solder changes to a dull color. Hobby shops sell rail joiners with wires already soldered to them. You can use them in place of the solder connections if you wish.

Route the wires beneath the tabletop. Drill a 1/4-inch hole through the tabletop near the wire connections to the terminal rerailer track or turnouts. Drill another hole near the power pack or Switch Control Box. Push the wires through the holes and run them beneath the tabletop.

Isolating the Tracks for Two Trains

To operate two trains independently on the same layout, the track must be divided into electrically isolated "blocks" so you can either park or run that second train. The locations of these electrical gaps are shown as letters A, B, C, D, and E on the track plans in Chapter II.

To electrically isolate portions of the track, cut through one or two of the rails with a razor saw. Use a small screwdriver to gently spread the cut ends of the rails about 1/64-inch apart so you're certain you've cut clear through. Fill the gap with a drop of thickened hobby-type cyanoacrylate cement so the rails cannot creep back together. Check the inside edge of the rail, after the cement hardens, and scrape away any excess cement that might cause a derailment. An alternate method is to simply replace one or both of the metal rail joiners with one of the plastic rail joiners sold by hobby shops.

Two-Train Control

First, decide if you really want to run two trains at the same time or if you merely want to park one train while the other runs. To park a locomotive or train requires just an electrically-isolated stub-ended siding with a single insulated gap or plastic rail joiner and a simple on-off electrical switch (electronics and model railroad shops call them SPST switches) wired to allow you to turn the power to that track on or off.

Track Plan 2 is an inverted figure 8 designed for the operation of one train. You could, however, park a locomotive (and a car or two) on any of the three sidings marked A, B or C. Cut an insulating gap or install a plastic rail joiner in just the outside rail at any or all of those points. Then, connect a wire from the main track's outside rail to the outside rail of the siding. Install an SPST switch into a wire linking the isolated rail to the mainline rail. You need at least TWO of these sidings so you can pull the first locomotive into a siding and "kill" its power, then you can turn the power on to the second locomotive and back it onto the track.

Track Plan 3 (the one we actually built for this book) shows the locations A, B, C, D and E (between the two turnouts) where insulated gaps or plastic rail joiners should be placed in at least one rail. This rather complex plan provides a maze of trackwork that can be used for parking one train on any of the inside tracks bounded by A, B, C and D. A second "parking spot" is the passing siding bounded by A and D. Five insulating gaps are needed but only two on-off switches to connect somewhere between C and the outer oval and between D and the outer oval.

Plan 1 is really designed for two-train operation. However, if you want to operate just one one train and park another, install plastic rail joiners or insulating gaps at A, D and E. Wire three SPST on-off switches between either oval and A, B and E to provide three "parking spots."

Running Two Trains at a Time

If you want to actually run two trains at a time, you will need a second power pack. Also, insulating gaps or plastic rail joiners must be installed in BOTH rails at the locations A, B, C, D and E on Plan 3 and at A, B and C on Plan 1 in Chapter II.

If you want to operate two trains on Plan 3, you should concentrate on switching cars around the inside tracks while a second train travels around the oval. The simplest wiring method is to use three power packs. Install two insulated rail joiners or cut gaps in both rails at A, B, C, D and E. Connect one power pack to the outer oval, the second to the passing siding A-D near A, and the third power pack to the innermost tracks near C. If you want to use just two power packs, you'll need a DPDT switch in place of the power pack for siding A-D that can throw power to either power pack. That wiring is too complex for this book, but it is explained in several books on wiring model railroads that are available at hobby shops.

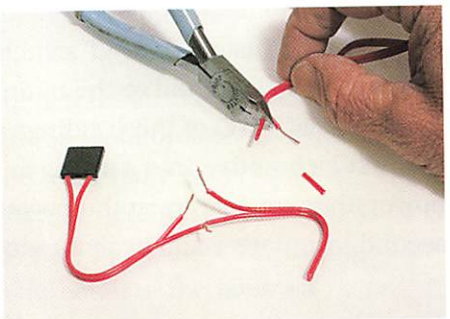
Layout 1 is the easiest to use for two trains because it is a double track mainline with a small yard. Again, the wiring will be simplest if you use three power packs. Cut gaps or use plastic rail joiners at A, B an C then connect the first power pack to the outer oval, the second to the inner oval and the third to the yard tracks. Really, you could run three trains at a time on this layout, with two circulating on the mainline while the third switches in the yard. It would be possible cut a gap or install a plastic rail joiner, with a wire and an on-off SPST switch as described for Layout 2, at D and/or E to "park" one of the three trains while the others played (more-or-less) musical chairs to move from one oval to the other, or in and out of the yard.

Remote-Control Switches

E-Z Track switches include electric remote control solenoids built into each switch. The three-wire cable from the switch must be plugged into the Switch Control Box and that, in turn, connected to the power pack. The wiring diagrams are included with every switch.

Slide-Out Control Panel

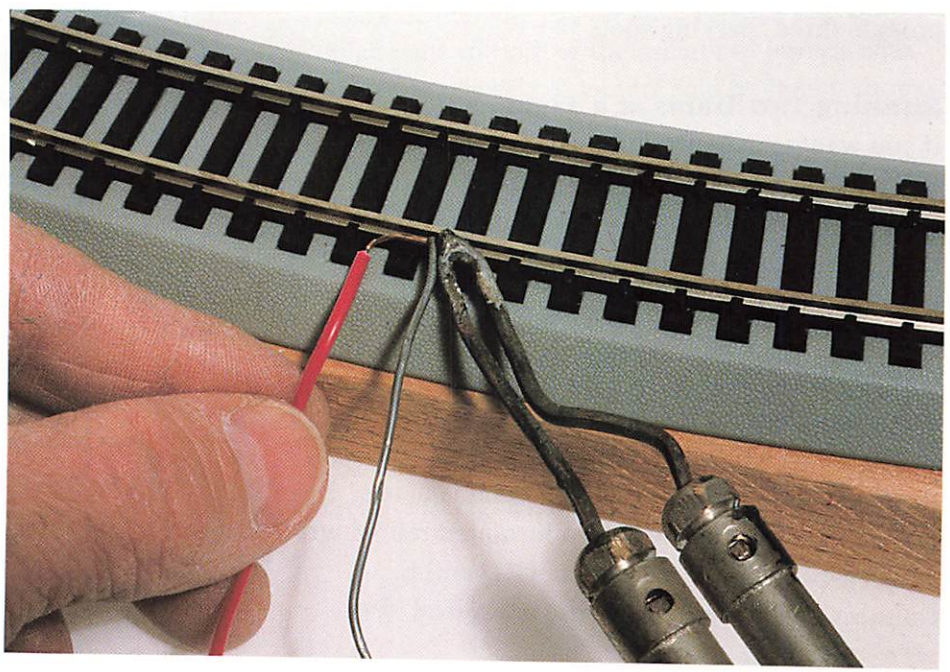
The power pack, Switch Control Boxes and SPST switches should be mounted on a small hardboard panel. You can build the panel into the side of the layout or into the profile of a mountain. We simply purchased a small sliding drawer, complete with mounting hardware, and mounted the electrical controls on a piece of hardboard fitted to the size of the drawer.

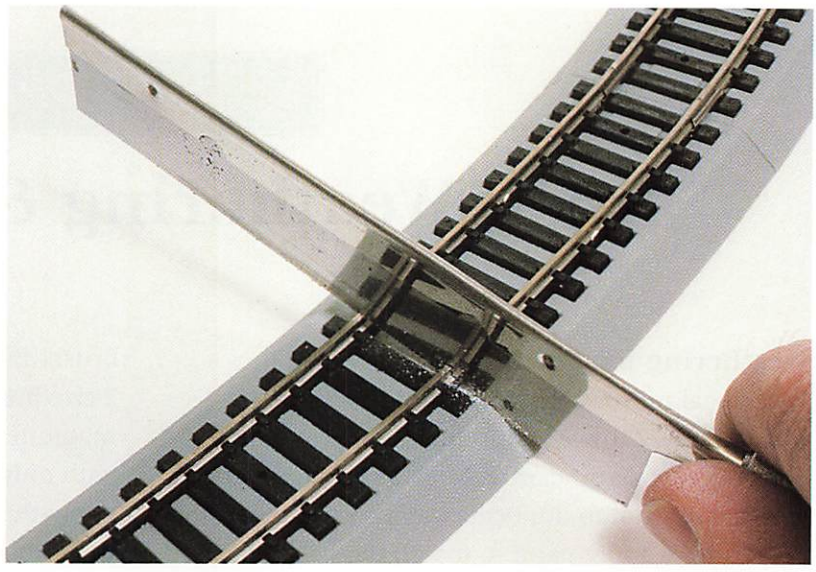


To extend the length of the E-Z Track wires, cut and strip the wires and splice-in the needed length of insulated wire.

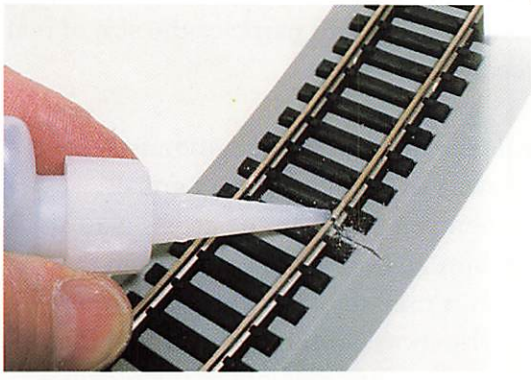
Drill 1/4-inch holes beside the switches (or power pack connections). Cut off the plug to fit the wire into the hole. Reinstall the plug on the wire, adding any extra length of wire needed.

Solder the wires to the channels on the outside of the rails.





Use a razor saw to cut electrical insulating gaps in the rails.



Fill-in the insulating gap in the rail with thickened hobby-type cyanoacrylate cement.

Mount the power pack, Switch Control Blocks and any SPST on-off switches on a piece of hardboard. We mounted the hardboard control panel in a small drawer for the layout in this book.

Chapter VII

Track Weathering & Ballasting

Weathering the Track

When real railroad track is brand new, it looks much like E-Z Track. With time, however, it will change color significantly. Look at the real railroad tracks you want to duplicate and buy a can of light grey/brown spray paint to match the colors of the weathered railroad ties and a bottle of rust-colored paint. You'll only want to apply a very thin coat of paint to the ties. To do that, you must pass the spray pattern very quickly over the track. Practice on a rolled-up newspaper until you have perfected the technique. Make that quick swipe or pass with the grey/brown spray to produce the faded-creosote look of real railroad ties. You'll color the rails and the ballast as well as the ties, but the rails will later be painted and the ballast will be hidden with additional loose ballast.

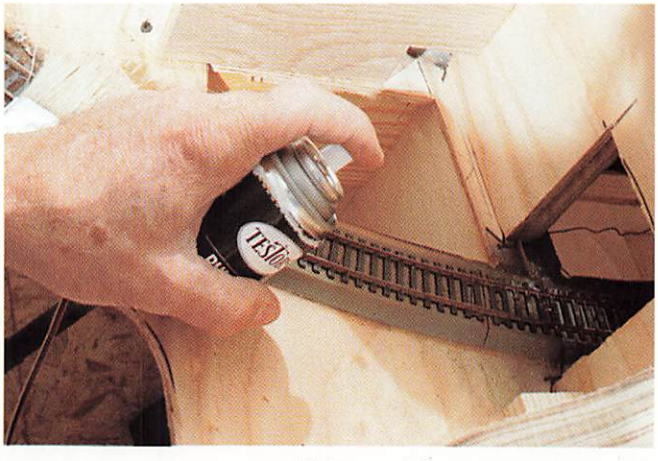
Use a number 1 brush to paint both sides of the rails. Again, be careful so none of the paint reaches the moving parts of any switch. When the paint is dry, clean the tops of the rails with one of the hard rubber erasers that hobby shops sell for that purpose.

Ballasting E-Z Track

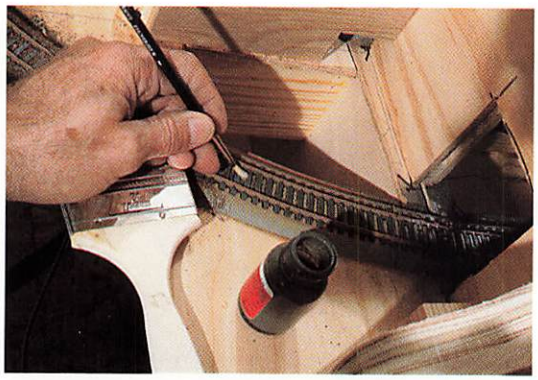
One of the primary rules of model railroading is to never, ever, leave small loose particles near the tracks. Those particles, whether they be ballast, dirt, gravel or ground foam scenery materials, can work their way onto the track and then into the locomotives to cause operating problems. If you decide to add ballast to your E-Z Track, the ballast must be glued tightly to the track and any excess material removed with a brush and a vacuum.

Glue the ballast to the E-Z Track with artists matte medium. This is a clear flat-finish latex paint sold by art supply stores. Brush the matte medium along the ballast shoulders with a 1/4 inch wide brush. Brush it between the ties with a number 2-size brush. Sprinkle ballast onto the matte medium before it has time to dry. It's best to work with only about a foot of track at a time so you can apply the ballast while the matte medium is still wet. Hobby retailers sell a variety of different colors of ballast, each with particles the size of real rock reduced to HO scale.

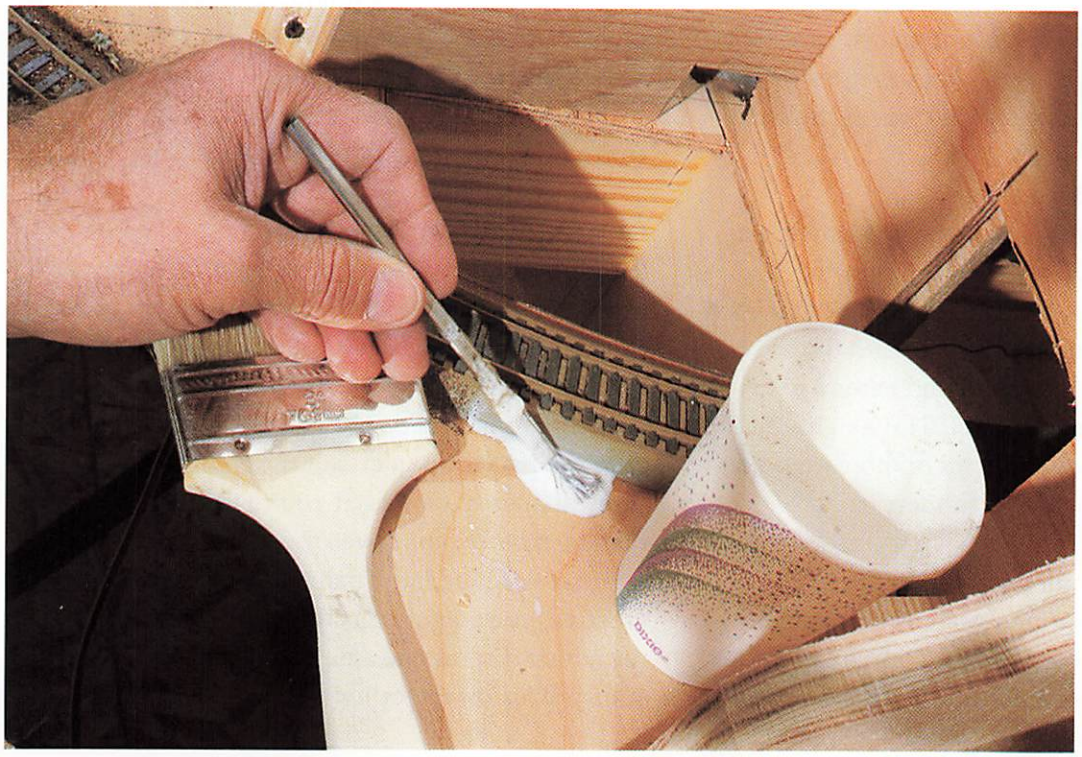
Another rule for trouble-free operation is to keep any ballast away from the working parts of switches. When you brush on the artists matte medium, be sure to keep it well away from the small pin that is used to manually actuate the switch, and also away from the slot around that pin. Do not apply matte medium to the moving point rails of the switch or to the ties around that area. If the ballast is a different color than the E-Z Track, find a paint that more-or-less matches the ballast and paint any still-exposed areas of E-Z Track ballast that are obtrusive.



Make a quick pass over the track with a spray of light grey/brown paint to weather the ties to look like faded creosote.



Paint both sides of the rails with rust-colored model railroad paint.



Brush artists matte medium on the sides of the ballast and between the ties.

Sprinkle your choice of ballast over the track while the artists matte medium is still wet. When the artists matte medium dries, vacuum all loose ballast from the tracks.

Chapter VIII

Sky Backdrops, Townsites & Riverbeds

The sky backdrop effectively divides this layout into two distinct scenes. In reality, the 4 x 6 layout becomes two 2 x 6 foot shelves placed back to back.
A small layout like this is much easier to treat with realistic scenery when there's a sky and an implied horizon behind the hills. The backdrop also serves as a scene divider so you can have a city scene just inches away from a country scene with no lack of credibility.

Building the Sky Backdrop

The sky backdrop for this layout is a sandwich of two pieces of 1/8 inch Formica counter top material glued back-to-back so it is smooth on both sides. The backdrop must be the length of the layout (73 inches, in this case) and extend to at least six inches above eye level. The height of the sky backdrop, then, will depend on how high you have built the benchwork to support it.

Use the mountain profiles to support the sky backdrop. Cut 1/2-inch plywood into the rough outlines of mountains to provide about 9 to 12 inches of vertical support for the sky backdrop on each end. Install the supports on each end and add at least one more somewhere near the middle of the layout, supported either by the plywood tabletop or resting on one of the 1 x 3 cross members.

If you want to split the layout into two 2 x 6 foot pieces, be sure the backdrop supports are only cemented to their own halves of the layout. Use about 9 to 12 inches of 1 x 2 on each side of the sky backdrop to support the backdrop behind the plywood mountain profile boards on the ends of the layout. Cement the strips to the backs of the mountain contours as shown in the photographs, using C clamps to hold the strips until the glue dries. The sky backdrop should be free to slide in and out of these supports so you can remove it when you move or disassemble the layout.

Mark the locations of the tracks where they pass through the sky backdrop. Remove the sky backdrop and cut 4 x 4 inch holes in those areas to provide clearance for the tallest and longest car or locomotive you ever intend to operate. Replace the sky backdrop and push those locomotives and cars along the tracks and through the backdrop to be absolutely certain there is enough clearance around the openings in the sky backdrop.

Painting the Sky Backdrop

Paint the backdrop a sky blue color using latex interior wall paints. If you have the talent, paint clouds on the backdrop. Clouds are relatively easy to paint if you use just a touch of white latex paint on a three inch roller. Twist the roller as you dab it onto the backdrop to create the rounded, puffy and filmy shapes of clouds. If you're unhappy with the results, simply paint over the clouds with the original sky blue latex paint. If you're really creative, you might consider painting a thunderstorm on one side of the backdrop, and sunny skies on the other.

Preparing Sites for Structures

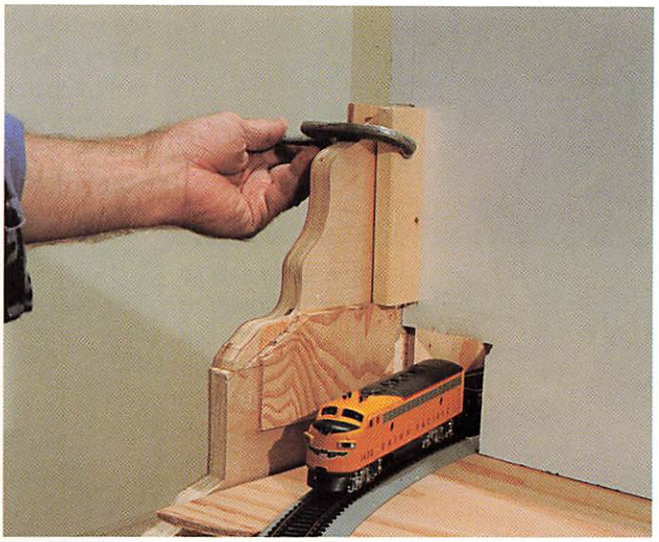
Our model city is elevated above the tracks to provide a large flat area without the interference of curved railroad track. Cut 1/4 inch plywood to the shape of the areas that will be occupied by both the streets and the buildings. Support the plywood with scraps of 1/2 inch plywood attached to the top edges of the sides and ends of the benchwork and to the 1 x 3 cross members with number 8 x 1-1/2 inch wood screws. Attach the 1/4 inch plywood with number 8 x 1 inch wood screws.

Supports for Rivers & Lakes

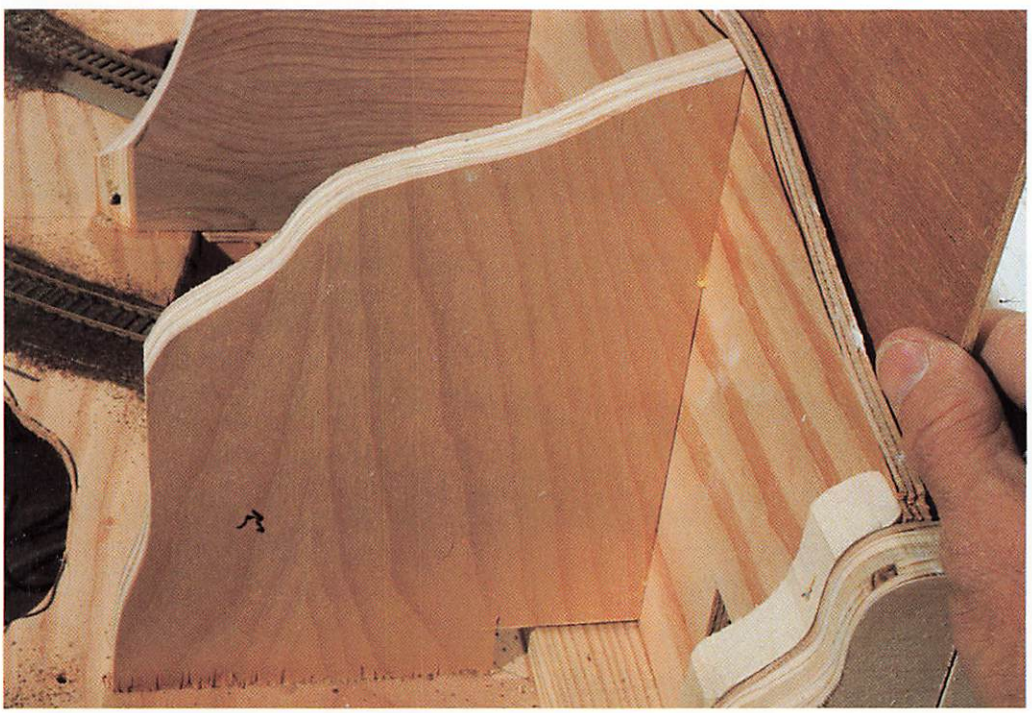
Most watercourses are located below track level. On this particular layout, we made provision for that by making the outside edges six-inches deep. If necessary, you can cut into the sides 3 to 4 inches and not reduce the strength of the layout enough to create significant problems. Use the saber saw to cut any small valleys.

The small lake or bay in the corner of the layout has a simple flat surface made, again, from 1/4 inch plywood. Carefully mark the edges of the benchwork with a pencil, guided by a ruler so there will be a perfectly straight and flat edge for the plywood to rest on. Cut into the 1/2 inch plywood edges of the benchwork with a saber saw.

Cement some 1 x 2 strips on the inside of the plywood layout edges to provide additional support for the 1/4 inch plywood lake surface. Cut the lake surface to match the edges of the layout and to extend beneath the bridge and beyond. Attach the lake surface with number 8 x 1 inch wood screws and glue. This plywood lake surface will help reinforce this corner of the layout.

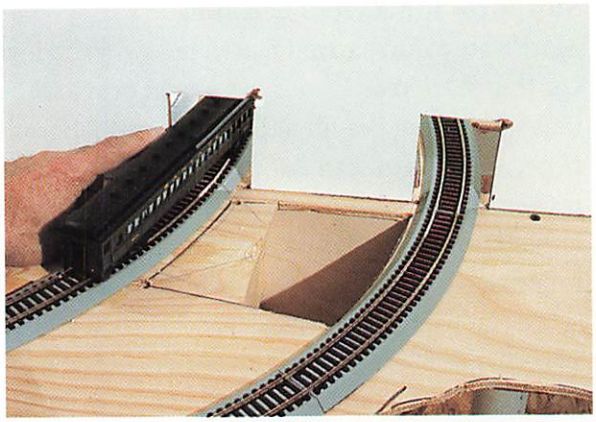


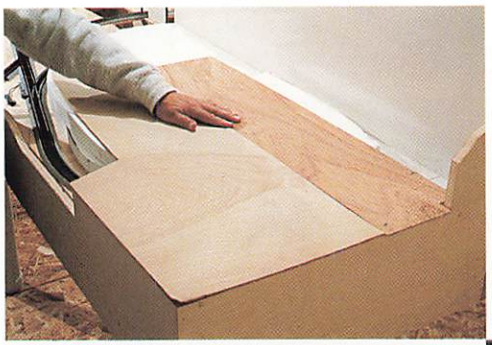
Support the sky backdrop with 1/2 inch mountain profile boards. Hold the backdrop in place with 1 x 2 strips glued to the plywood. Clamp the strips in place until the glue dries.



Add one or two additional 1/2 inch plywood mountain profiles to support the center of the sky backdrop.

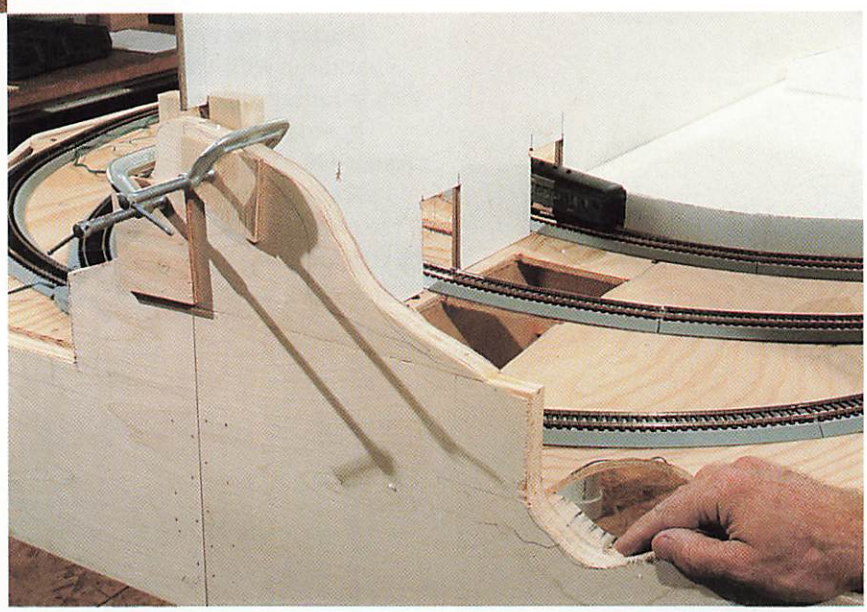
Cut 4 inch square holes in the sky backdrop at the points where the tracks tunnel through. Check the clearances with the tallest and longest cars and locomotives.

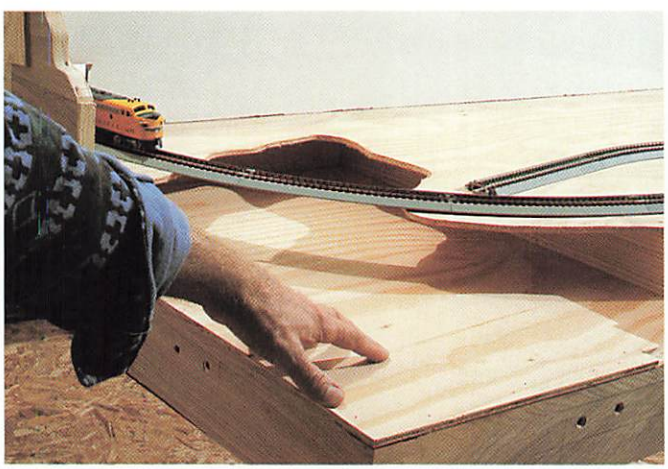




Cut a piece of 1/4 inch plywood to support the entire city and street area. Support the 1/4 inch plywood on 4 inch wide 1/2 inch plywood supports glued to the sides of the layout.

Use a saber saw to cut a stream or riverbed into the sides of the layout.





The lake or harbor on this layout is a sheet of 1/4 inch plywood that extends beneath the tracks and rests on a cutout area on the edge of the benchwork.

Chapter IX

Shaping Tunnels with Foam Panels

We chose common white bead board to fill in the areas beneath the city, to form the linings of the tunnels, and to build up the shoreline around the lake or bay. It works well for stacking and filling to give the tunnels and the lake a more solid structure than bare open grid benchwork provides. The material also provides some noise reduction so the trains sound like they are really entering tunnels, not hollow mountains.

Cutting the Foam Board

A conventional saber saw works well for cutting the bead board. The cuts do produce a lot of clinging dust, though, so it would be best to have a vacuum cleaner with a hose extension in operation while you cut. Have a second person hold the hose near the saw to remove the dust before it has chance to fly around the room. If you want perfectly straight cuts, use a piece of 1 x 3 wood to guide the saw.

Bead Board Tunnels

The bead board has virtually no weight, so we used it to build up contours and to help support the city scene. We even used it to line tunnels so they did not look hollow. The tunnel beneath the city is lined with a stack of two of the two inch thick bead boards. Be sure to cut access holes through the bead board to match those in the plywood table top. Also, check the side clearances on the curves by pushing those long passenger cars and locomotives through the tracks BEFORE you cover the tunnels.

The tunnel portals are resin castings available from hobby shops. We used retaining walls with stone patterns matching the tunnel portals for walls leading to the tunnel portals. Install the portals with Liquid Nails. The portals can be braced with pieces of one or two inch thick bead board.

Fitting Retaining Walls

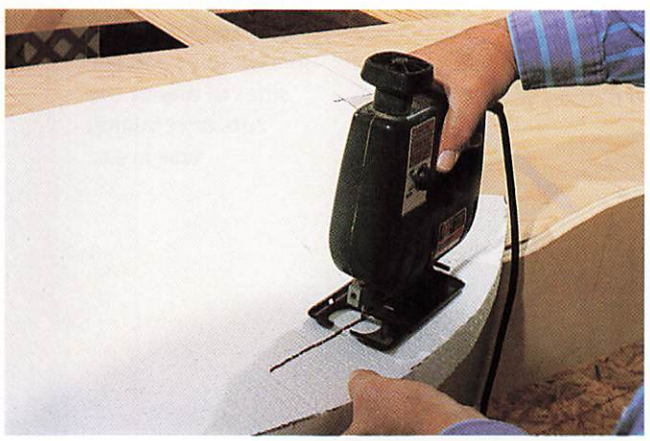
The retaining walls near the elevated city scene are also resin castings. The castings can be cut with a razor saw or a hack saw. To fit the retaining walls to a curve, cut the walls vertically along the right side of each vertical pillar. Cement the individual pieces to the bead board with Liquid Nails. DO NOT use a hot glue gun or any heat near the bead board—-some brands give off dangerous fumes when heated. Be sure to check the side clearances with those long passenger cars and locomotives before gluing the retaining walls in place.

Contour-Shaping with Foam Board

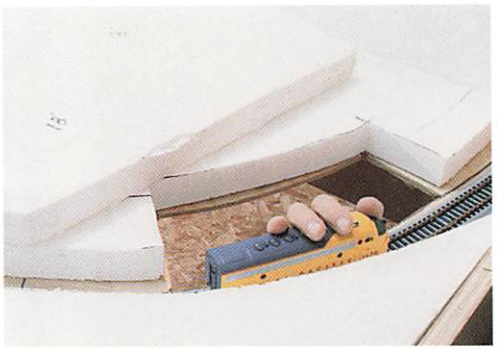
A stack of two of the two-inch thick sheets of bead board was used to make the fill and land contours near the lake or bay corner of the layout. The bead boards provide an easy method of making the near vertical walls around the lake or bay.

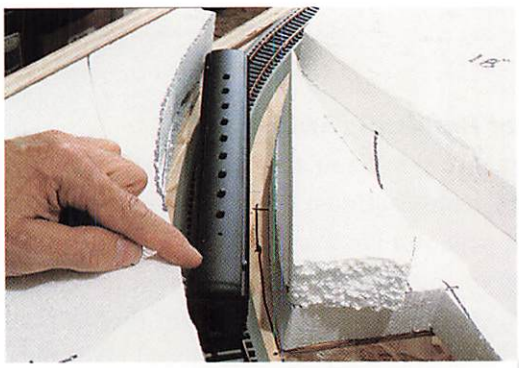
The remaining portion of the layout and the exposed edges of bead board can be covered with the plaster-soaked gauze as described in the next chapter.

Use a saber saw to cut the bead board. Run a vacuum cleaner hose near the saw as you cut to suck up the clinging dust.

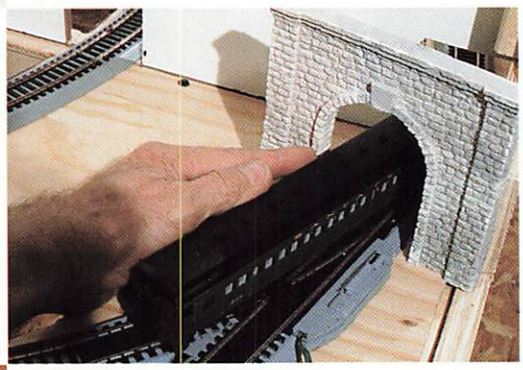


Cut access holes in the bead board to match the access holes cut in the plywood table top.

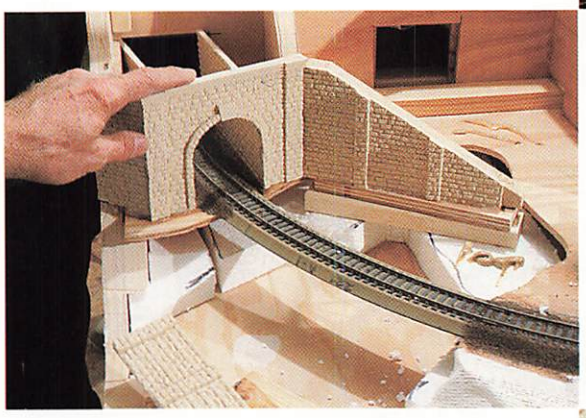




The bead board can be used to line the interior of tunnels. Be sure to check the side clearances with long passenger cars and locomotives.

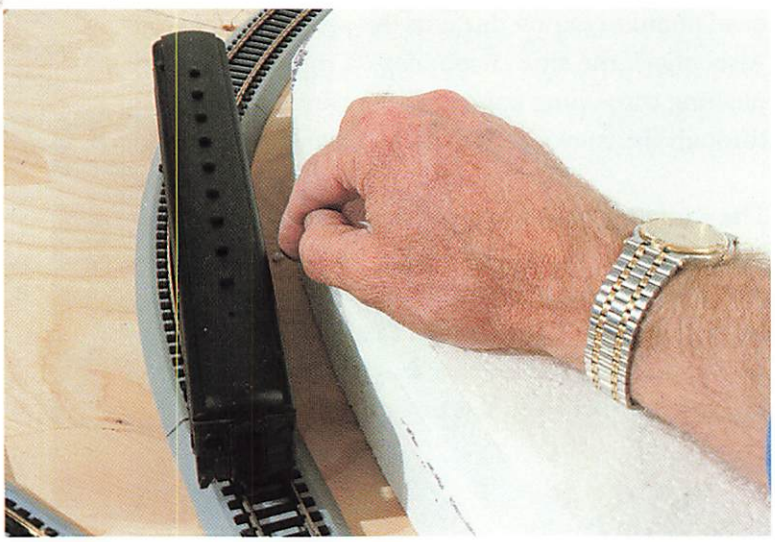


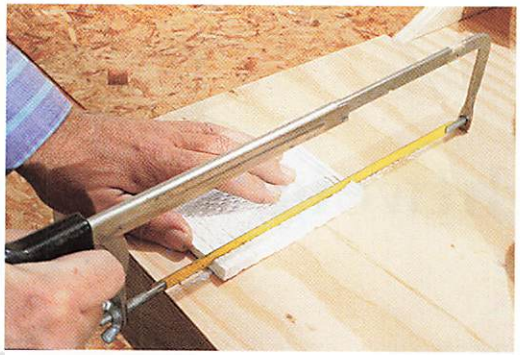
The tunnel portals can be installed now, using the bead board for support and to simulate the tunnel lining inside the portal.



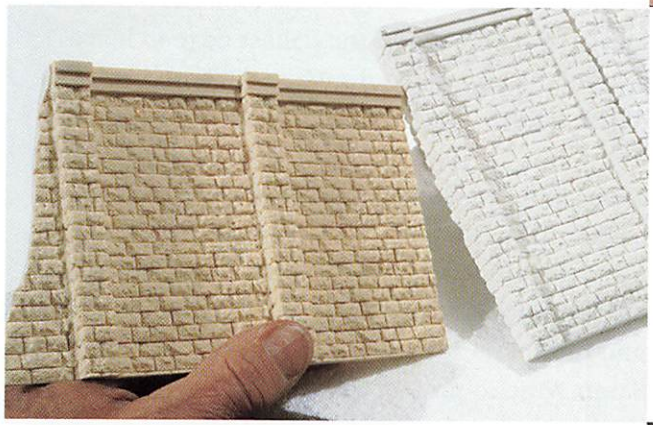
This tunnel portal and its retaining wall are glued in place. 1/2 inch thick bead board is used to simulate the tunnel lining between the portal and the sky backdrop.

Again, be sure to check the clearances between the longest passenger cars or locomotives and the sides of any of the cuts or retaining wall areas.

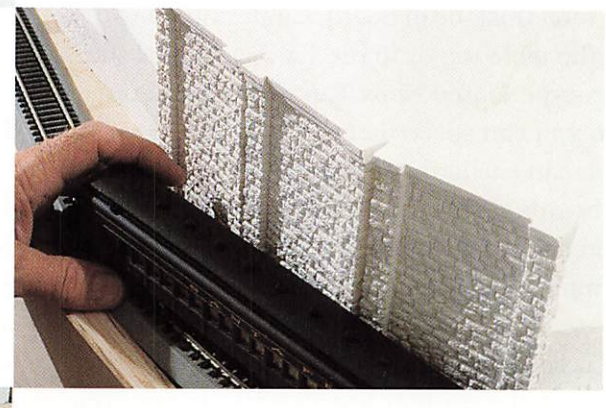


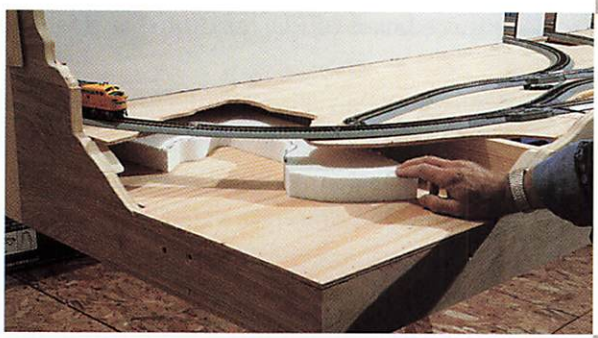


The cast resin retaining walls can be cut with a razor saw or hack saw.

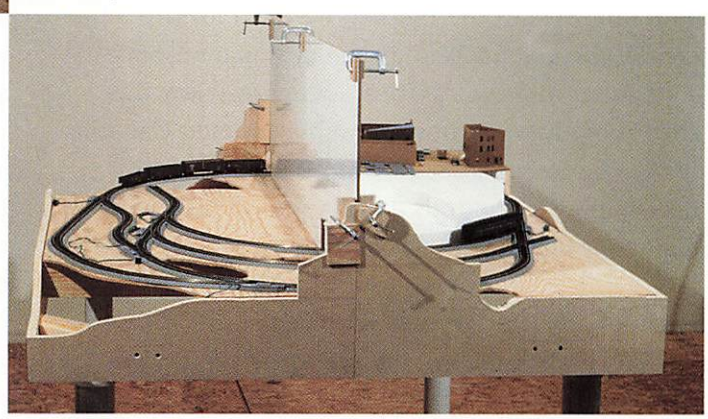


Cut the retaining wall along the edges of the vertical pillars, then reassemble them with Liquid Nails to form curved retaining walls.





Use the bead board to build landscape contours around the lake/bay area.



The layout is now ready for the larger scenery contours that will produce the mountains above the tunnels. The clamps that hold the two 1/8 inch sky backdrop panels together and to the contour supports are still in place.

Chapter X

Lightweight Foam & Plaster Hills and Valleys

Conventional plaster scenery, applied over metal door screen and braced with wood, is extremely heavy. We opted for a combination of lightweight white foam bead board scenery contour supports with a thin layer of plaster-soaked gauze for the scenery shapes. It would be okay to substitute any of the extruded foam insulating boards like blue Styrofoam for the white bead board.

The Mountain Contours

Use a saber saw to cut the contours of mountains into two inch thick bead board. Cement the bead board to the table top or to the 1 x 3 cross members with latex-type Liquid Nails. Cut enough contour boards so you can space them 12 to 18 inches apart. You can easily modify the shapes of the contour boards with a serrated-edge kitchen paring knife. You can preview the shape of the scenery by draping moist newspapers over the contours.

When you are satisfied with the shapes, cover the gaps between the contour boards with strips of one inch wide masking tape. If the tape won't stick to the rough edges of the bead board, use some tee pins or thumb tacks to hold the tape to the bead board.

Shaping Scenery with Newspaper

The areas between the contour boards can be filled with wadded-up newspaper, rather than spanned with tape. That's the method we used for the mine area of the layout. Wad-up the newspapers and stuff them into the cavities. Again, preview the shapes by draping moist newspapers over the area. It's easy enough add a few more wads of newspaper for mounds and rises or to just push down on the existing wads for depressions.

Protecting the Layout from Excess Plaster

Before you begin applying plaster to the layout, cover all the tracks and ballast with two inch wide strips of masking tape. Let the tape extend out at least 1/4-inch beyond the ballast edge to leave space for a simulated drainage ditch on each side of the tracks.

Tape some waxed paper or plastic bags to the sky backdrop so the plaster will not stick to it. Cover the road and flat city areas with clear plastic. It's also wise to wrap the faces of the retaining walls and tunnel portals with sticky clear plastic like Saran Wrap to protect those surfaces from the sloppy plaster. Be sure to cover the floor all around and beneath the layout with newspaper, too.

Lightweight Plaster Mountains

We used plaster-soaked gauze for the scenery surfaces. Woodland Scenics Plaster Cloth and Activa's Rigid Wrap are two common brands. The material is also available in drug stores for use in making splints for broken arms or legs but that material is much more expensive than the hobby products. We used three boxes of Plaster Cloth for this layout.

Fill a paint roller pan with water. Cut a piece of the plaster cloth about two feet long. Look carefully at the dry plaster cloth and you'll see that most of the plaster is mounded onto one side—-that's the "top" side and you want to keep it facing out as you apply the plaster cloth. Hold the cloth by the upper two corners and gently drag it through the water. Then, drape the dripping wet cloth over the scenery contours as shown in the photographs.

Tuck the outer edges of the plaster cloth under themselves to provide some extra strength along the sky backdrop and along the edges of the benchwork. Apply a single layer of the cloth, followed immediately by a second layer. You may need to spray the first layer with a mist of water to get the second layer to stick to it. Rub the surface

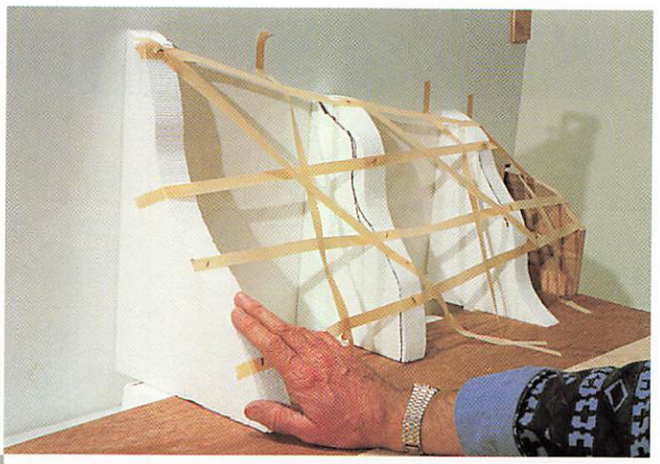
with your hands to work the plaster into the cloth and to roughen the surface so it looks more like dirt than smooth plaster.

Self-Supporting Scenery

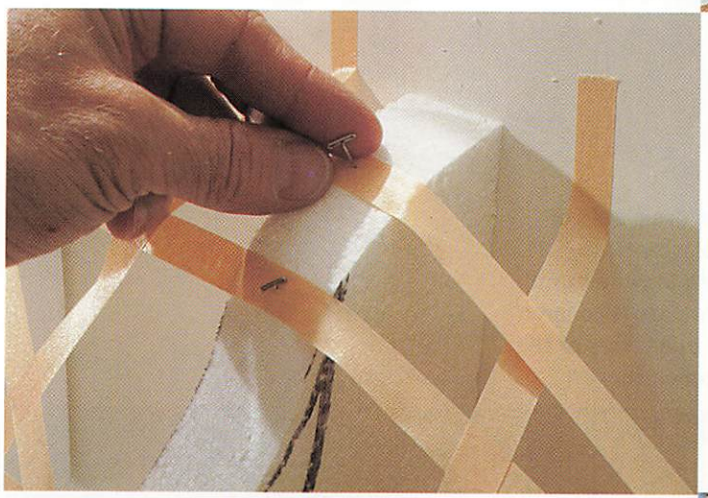
When the plaster cloth sets, it will be strong enough to be virtually self-supporting. The bead board and wadded-up newspaper are there mostly to form the basic shapes. The contour boards at the edges of the layout are essential, however, to give the mountains something to support their bare edges. Let the plaster dry overnight before painting it.

Changing Scenery

You can change the shapes of any of the mountains by adding more wads of newspapers for more rounded shapes. If you want a hollow face, or somewhere to insert a rock casting, the plaster cloth can be cut with a saber saw. Another couple of layers of wet plaster cloth will cover any corrections you make.



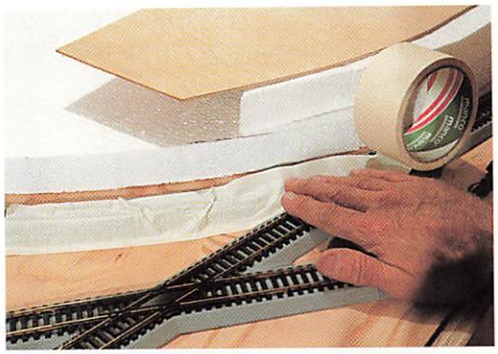
Cut scenery contours from two inch thick bead board. Cover the areas between the contour boards with strips of masking tape.



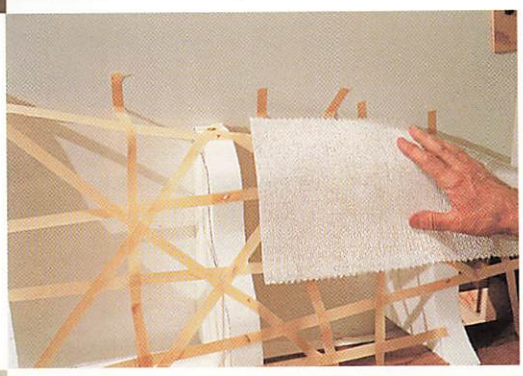
Hold the masking tape on the rough edges of the bead board with tee pins or thumb tacks.

You can use wadded-up newspaper, rather than masking tape, to fill-in the areas between the scenery contour boards.

Protect the track (and an area 1/4 inch to either side of it) with strips of two inch wide masking tape.



Cover the road areas, the retaining walls and the tunnel portals with clear plastic or Saran Wrap.



Dip a two foot piece of plaster cloth in water and drape it over the scenery contours.

Add more pieces of the plaster cloth, dipped in water, until the surface is covered with two layers of the plaster cloth.

Use your fingers to work the plaster into the cloth and to roughen the surface so it looks like dirt.

Chapter XI

Rocks, Retaining Walls & Bridges

When the basic scenery shapes are complete, the layout is ready for surface details like rock castings, retaining walls and bridge abutments. You may need to cut into the existing shapes with a saber saw to fit these items and it will be necessary to surround them with additional pieces of plaster cloth.

Rocks & Cliffs

Hobby retailers sell a variety of latex rubber molds to create the textures of rocks. Mix some common Plaster of Paris into the consistency of thick soup and pour it into one of these rock molds. Let the plaster rest while you wiggle and shake the mold slightly. The instant you can see the plaster begin to harden, slap that plaster-filled mold against the side of the mountain. Remove the mold gently the moment you feel the plaster actually harden. It may take a few tries to get the technique right, but it's great when it works.

If you cannot master the "wet rock" technique, just use the molds to cast a few rocks and "cement" the rocks to the mountainside with wads of wet plaster cloth. You can use a single rock mold to create a two foot square cliff; just butt one casting to the next. When you peel back the mold, work some of the still-damp plaster into the edges of the previous rock.

You can smooth out the junction between the rocks and the faces of the mountains with small wads of wet plaster cloth. Don't worry too much about small gaps around the rocks; those can be filled later with loose gravel or ground foam.

Retaining Walls

Most of the retaining walls should already be in place near the tracks. At this stage, however, you may want to add some additional retaining walls near building sites or beside roads. Cement the walls in place with Liquid Nails and let it dry. Fill in the areas behind the walls with more wadded-up pieces of wet plaster cloth.

Building Bridges

You cannot install the abutments for the bridges until you know exactly where the bridges will be located. We used one of Bachmann's truss bridges from their Bridge & Trestle set (Item No. 46226) to span the lake. Cut a piece of 1/8 inch plywood or .125-inch thick sheet styrene (hobby retailers sell it) the length of the bridge and, for this curve, about six inches wide. Cement the sides of the bridge to the plywood or styrene. (The sides of bridge will fit beneath the plywood that you did not remove from beneath the E-Z Track.) Cement the bridge to the plywood with Liquid Nails and wedge it in place with some scraps of wood until the cement dries.

Bridge Abutments

We used a Woodland Scenics bridge abutment set for this bridge. The height of the abutment was reduced so it could be wedged between the bottom of the bridge and the plywood surface of the lake. Cement the abutment to both the bridge and the plywood with Liquid Nails.

Fill in the area between the tracks and the abutments with tight wads of newspaper. Cover the newspaper with small panels of wet plaster cloth. Work carefully and you can keep most of the plaster from the abutment's face. If you do dribble plaster, it can probably be cleaned up with just water and a tooth brush if you work within an hour or less after applying the plaster.

Finishing the Terrain

At this point, the entire layout should be covered with either masking tape-covered track, plastic-covered roads, bare plywood lake surfaces or plaster. There's very little "plywood-flat" ground near railroads, so you'll want to add some undulations to those remaining flat surfaces. Use small pieces of wet plaster cloth to fill in any areas between the tracks that are bare plywood. Rub the still-wet plaster to shape and feather the edges and to roughen the surface.

Use a latex rubber mold to make rocks. Fill in the areas around the rocks with wadded up pieces of wet plaster cloth.

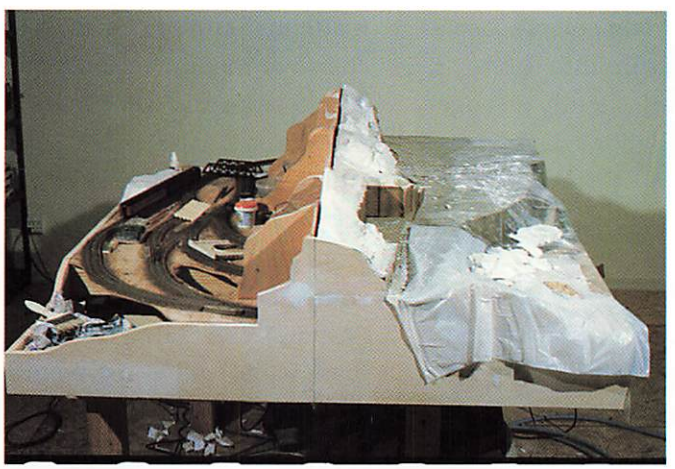
Use wadded up plaster cloth to fill in behind any retaining walls.

Cut a six inch wide piece of 1/8 plywood or .125 inch styrene plastic, and glue the sides of the bridge to it.

Cut the bridge abutments to fit snugly between the bottom of the bridge and the surface of the lake.

Carefully carve bead board away from the edges of the lake to provide a natural-appearing cliff or slope behind the bridge.

Fill in behind the bridge abutment with wadded newspaper and cover the area with two layers of wet plaster cloth.



Cover any exposed bare plywood surfaces with small pieces of wet plaster cloth and smooth the edges.

Chapter XII

A Texture System for Landscaping

So far, you have seen the results of your effort at building scenery as basic shapes. Now, you can add more realism and life to those efforts as you add color and texture.

Staining Rock Faces

Rock faces have a rough texture that must be highlighted with two or three stains to bring out its depth. To do this, use acrylic or latex paints; hobby retailers sell a variety of colors in small bottles. Mix about nine parts water to one part paint and add a drop of dishwashing detergent to break up the surface tension of the water so it will flow into the crevices.

For maximum realism, try to match the textures and colors of real rocks near the area where your railroad is supposed to be located. Start with a relatively light beige or reddish brown to simply color the white plaster. Use a two inch wide brush to flow this first light "wash" over the rocks. Let that wash dry, then mix another darker wash (nine-parts water to one part paint) of dark reddish brown (Oxide Red, in railroad colors) or dark brownish red (Boxcar Red, in railroad colors) and flow this over the rock faces. For some rocks, you can leave this mixture as-is. For darker rocks, mix a final dark stain with nine parts water to one part dark brown (Roof Brown, in railroad colors). Use a number 2 brush to flow this mixture into the cracks of the rocks. You can apply slightly stronger mixtures of these colors to highlight or darken portions of the rock.

Painting the Earth

Buy a quart of grass-green latex paint. Slather this over virtually all the bare plaster (that is not covered with rock face) to provide an underlying color. Work with very bright lights so you can see where the white plaster shows through. Bend down and look at the scenery from several angles at track level to see if any white spots are visible.

Grass and Weed Textures

We used a variety of Woodland Scenics ground foam textures to great effect. You can apply these textures with a "Scenic Sprinkler" or pick them up a pinch at a time in your fingertips and scatter them over the surface. Woodland Scenics calls their ground foam "Turf." Use Fine and Coarse for ground cover and Extra Coarse for clumps of weeds or bushes. Similar foam is available from AMSI, Faller and Sun Ray. Hobby retailers may carry one or all of these brands.

Before applying the foam textures, spray the area you are going to cover with a mixture of four parts water and one part artists matte medium or use Woodland Scenics' "Scenic Cement." Work with only a square foot or less at a time so the matte medium or cement does not dry. Use the sprinkler bottle or just grab a pinch of the fine foam between your fingers and sprinkle it on. We suggest using a greenish "Green Blend" or brownish "Earth Blend" for this first step. Let it dry for a few hours, then spray the entire area again and sprinkle on a lighter shade of green or brown in the fine size to provide a more variegated effect. Finally, spray the area with matte medium or cement a third time and add coarse or medium-grind foam to provide variation in both texture and color.

We used this same process on the slopes behind the city and behind the mine as well as on the grass lawn. For the grass lawn, however, we skipped the medium size and added a third color (yellow) fine foam. Yellow/beige colors of fine foam work well to represent dead leaves, or grass baked in the sun.

Weeds and Bushes

The cracks in the rocks and any crevices or hollows in the other slopes are prime places for small bushes to grow. Simulate those bushes using a pinch of coarse ground foam. Dip the turf into a puddle of artists matte medium or Scenic Cement and push it into the crevice in the rocks. Repeat the process to provide clumps of bushes and weeds in random locations around the layout.

Talus, Sand and Pebbles

Simulate the smaller rocks and sands with some of the fine, medium and coarse grind ballast. Woodland Scenics, Faller and Sun Ray are three firms that make ballast. Your hobby retailer may have other brands. Select colors that are similar to those you used on the rocks. Sprinkle the ballast around the edges of creeks or lakes. Add some of the different sizes of rock-colored ballast at the bases of any cliffs or rock outcroppings to simulate talus. Start with the coarse size, followed by medium, then fine. Use a brush to move the rocks around and to sweep away any excess material. When you're satisfied, spray the area with that mixture of water and artists matte medium or Scenic Cement.

Trees and More Trees

We used tree kits with "Foliage Clusters" for leaves on the hillsides and in the park of this layout. Install the trees by drilling 1/8-inch holes in the plaster or plywood. Dip the end of each tree in Liquid Nails and place it into the holes. Disguise the base of the tree with a sprinkling of fine ground foam.

Clean-Up Time

When you are completely satisfied with the layout, remove the masking tape from the track. Brush on a thick layer of artist matte medium or Scenic Cement then add fine rock-colored ballast and fine foam to the areas beside the track. When the final touches have dried for about a week, carefully vacuum the track and the area about an inch to either side of the track to remove all traces of loose material.

Simulating "Wet" Water

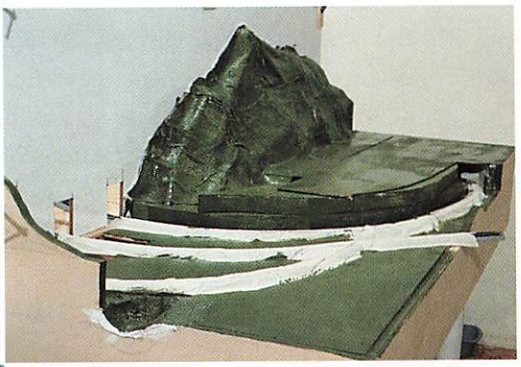
Artists gloss medium is an excellent material used to simulate the wet look of water. You can pour artists gloss medium down a mountainside to simulate a running spring, or down a gully to simulate small a creek. The stream will be especially realistic if you've prepared the bottom of the creek with a mixture of fine, coarse and medium ballast in rock colors.

Artists Gloss Medium can also be used to provide a glossy surface on a flat lake. We painted the lake on this layout with artists acrylics to simulate the beige colors of the shallow water at the edges, blended into a deep blue/green for the deep water. A final coating of artists gloss medium adds the "wet look."

First stain the rocks with a light beige or reddish brown wash of paint to dull the stark white look.

Highlight the natural crevices and hollows of the rock castings with a second wash of dark brown.

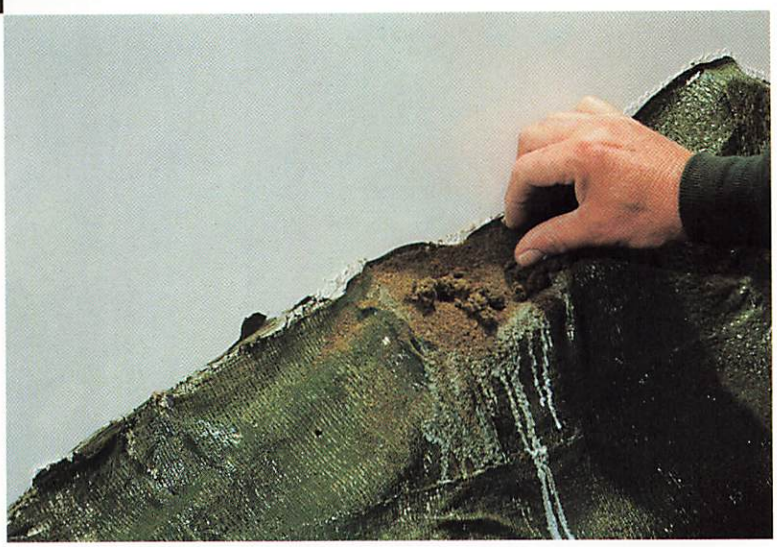
Use grass green latex paint to cover every nook and cranny of the raw white plaster.



Paint everything up to the edges of the masking tape over the track with the grass green.

Spray or brush the hillsides with a mixture of artists matte medium and water or Woodland Scenics' "Scenic Cement."

Sprinkle fine grind green foam over the still-wet matte medium or Scenic Cement.



A "Scenic Sifter" can be used to apply the ground foam to the hillsides.

Dip clumps of Extra Coarse ground foam into some matte medium or Scenic Cement and tuck them into the crevices of the rocks to simulate weeds.

Use fine, medium and coarse ballast to represent small rocks, stones and talus. Brush the rocks into the exact shapes you want, then spray them with a thick coat of artists matte medium and water or Scenic Cement.

Paint the plywood lake with beige tones for the shallow shore and deep blue/green for the deeper waters. Add the "wet" look with a final coat of artists gloss medium.

Chapter XIII

Realistic Streets & Roads

The road surface on this layout is actually the 1/4 inch plywood that supports the city. The road itself is defined by curbs made from 3/32 inch square pieces of wood (near the grey mill building) or by the edges of the 3/32-inch thick sidewalks. The road itself is a minimum of six-inches wide.

Creating Curbs & Sidewalks

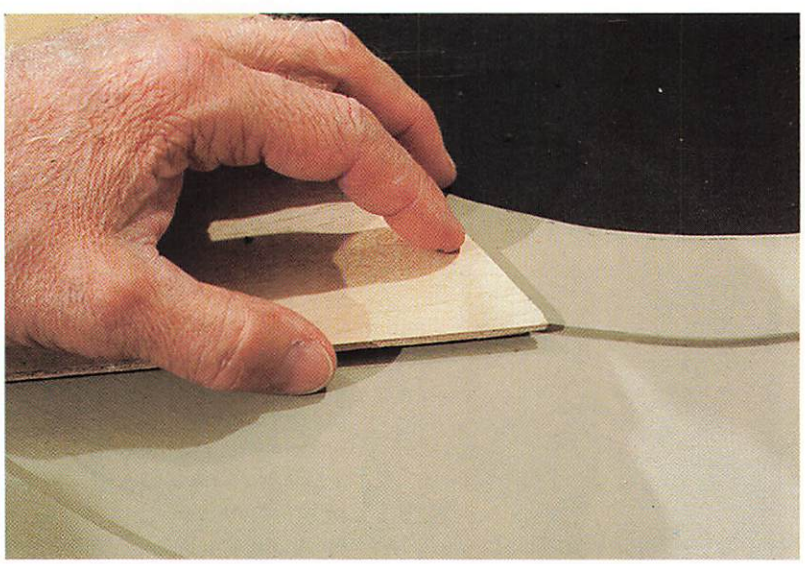
Cut the curbs and the station platform from 3/32 inch plywood using a saber saw. Use a fine-tooth blade to make the cut as smooth as possible. Guide the saw with a straight piece of wood to be sure the straight sections of sidewalk really are straight. Use a piece of curved track to mark the curve for the station platform. Cut slowly and carefully, then sand the edges smooth. Seal the edges with several coats of sanding sealer so no wood grain is visible. Glue the sidewalks to the road surface with Liquid Nails and hold them in place with weights for a day.

The park is a solid piece of 3/32 inch plywood with the sidewalks painted on, and ground foam used for the grass textures. The trees are mounted in 1/8-inch holes and their bases are covered with green fine foam.

Simulating Concrete Streets

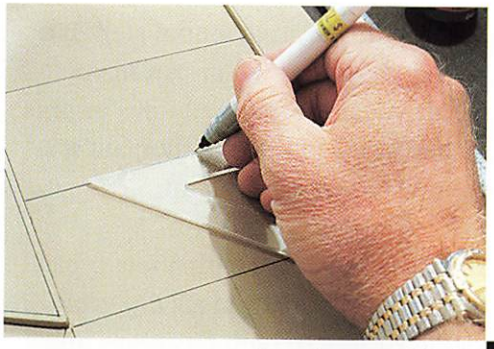
Paint the streets and the sidewalks with a grey/green flat acrylic paint to simulate concrete. Use a fine felt-tipped black pen to mark the seams on the road and the edges of the curbs. Use the same pen to make a few wavy lines to suggest cracks in the concrete. Rub a piece of black artist's chalk on some fine sandpaper to produce a powder. Brush the powder on the street to duplicate the patterns of black tire marks and spots of soaked-in oil drippings. We created lines down the center of the street using tape from Circuitron's Scale Scenics line. You can buy that at most hobby retailers or substitute 1/16-inch wide white drafting tape from an artists supply store.

The bridges along the edges of the road are really just pieces of an HO scale plate girder bridge cut and filed flat on the back. The pieces are glued to the edges of the 1/4 inch plywood with Liquid Nails.



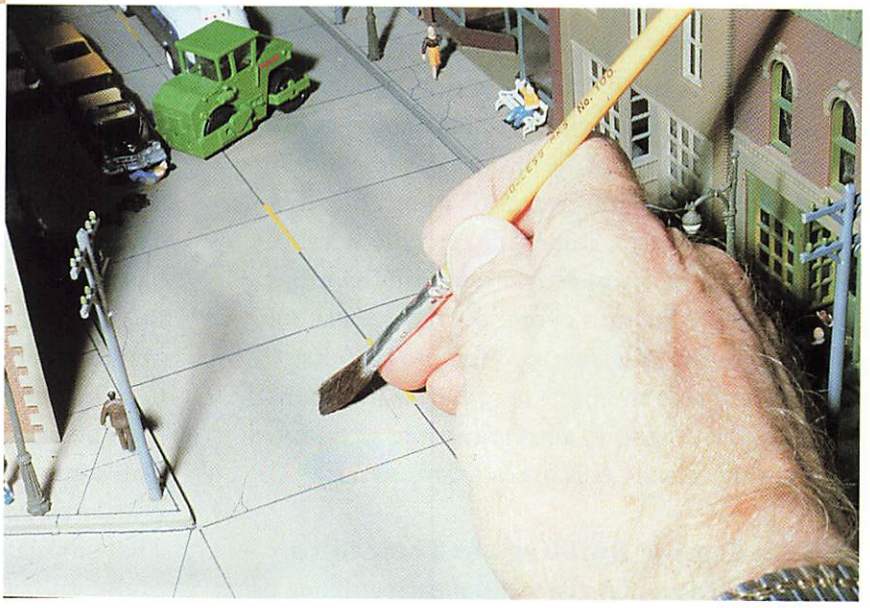
Cut the sidewalks, the station platform and the park area from 3/32 inch plywood using a fine-tooth blade in a saber saw.

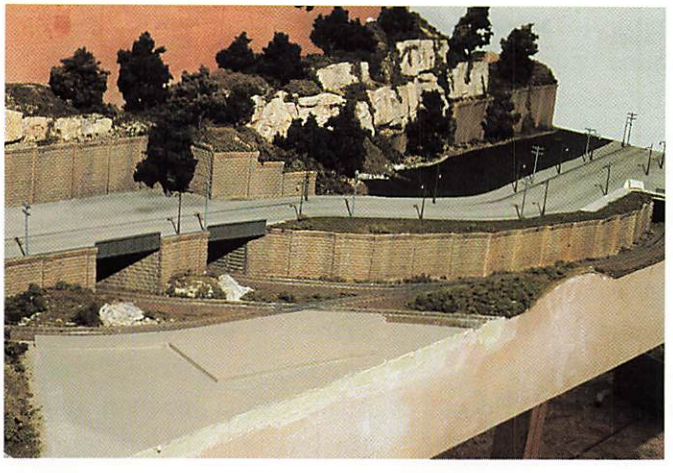
Use Liquid Nails to hold the sidewalks and platform to the road surface. Use weights to hold the plywood while the glue dries overnight.



Use a fine felt-tipped black pen, guided by a straight edge, to make the lines that simulate the joints in the concrete streets, sidewalks and curbs.

Powder some black artist's chalk and brush it onto the streets to simulate tire marks and oil spills.





The scenery and streets are complete. The layout awaits the final touches of buildings, vehicles, people and trains.

Chapter XIV

Buildings, Vehicles & People

If you have built this layout along with us, you have now set the scene for the buildings, automobiles and people that imply there is real life beside the tracks.

Assembling Plastic Kits

All of the buildings on this layout are from the *Bachmann-Plus*™ series of building kits. These kits require some previous model building experience for best results. It really is necessary to read the instructions carefully and to identify each and every part. Your care will be rewarded with completely realistic buildings.

First cut, don't break, the parts from the molding sprues. (Note: windows and doors should be painted before removal from the sprue. Painting tips are provided later in this chapter.) Buy a large flat file or, better, a cabinet maker's file with fine teeth on one face and coarse teeth on the other. Use the file to smooth every joint. Next, use tube-type cement for plastics to assemble the kits. When you press the parts together, work them back and forth a bit to get the cement to dissolve some of the plastic and make a firm bond.

Test-Fitting the Buildings to Their Sites

Temporarily assemble the walls of each building using masking tape or clear plastic tape. Place the buildings where you think you want them on the layout to see if there is enough room. We found that two of the buildings needed to be shortened by about two inches to leave enough room for our streets and curbs.

Sometimes one structure can be used to simulate another. We used the *Bachmann Plus* Sand & Coaling Tower (Item No. 35111) as a mine by removing the sand tower. The kit's Hoist House was removed and serves as a tiny station, while the Sand House serves as a small shanty. This one modified kit made an entire town!

Finishing the Buildings

Assemble the walls of each building and paint them. Unpainted plastic always looks like unpainted plastic, so this is an essential step. It's amazing how much difference color can make in a building. There are at least three buildings on this layout that are duplicates of one another, but it's hard to spot them with their new paint.

Cover the walls of the buildings with a few typical city signs. Hobby retailers usually stock dry transfers and decals. A wide variety of both city signs and advertisements are available.

Weathering Buildings

When the walls are finished, weather the buildings using powdered artist's chalks. You can buy artist's chalks (they are not the same as conventional oil-based artist's chalks) at larger art supply stores. Buy black, burnt umber, burnt sienna, grey and ochre. Rub each color on a piece of fine sandpaper to reduce the chalk to powder. The powder can then be brushed onto the building to simulate age. Dab some of the lower portions of the walls with powdered pastels that match the surrounding dirt. That simulates rain-splashed soil. The lower areas of the walls of city buildings are often black from rain-splattered dirt.

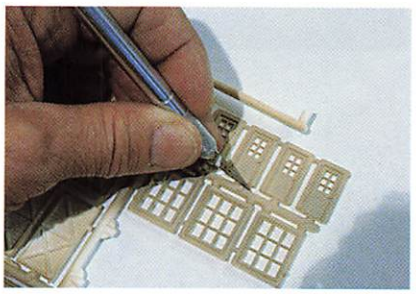
The Finishing Touches

Use white glue to install the windows. (Most plastic cements will craze, or etch, the plastic to make the windows cloudy.) When the buildings are installed on the layout, be sure they sit absolutely flat. If not, file the base of the building until it does sit flat. Hold them in place with a bead of rubber cement (available from stationery stores) so you can pry them loose if you need to. If there is a seam visible between the sidewalk and the base of the building, fill it in with some powdered grey

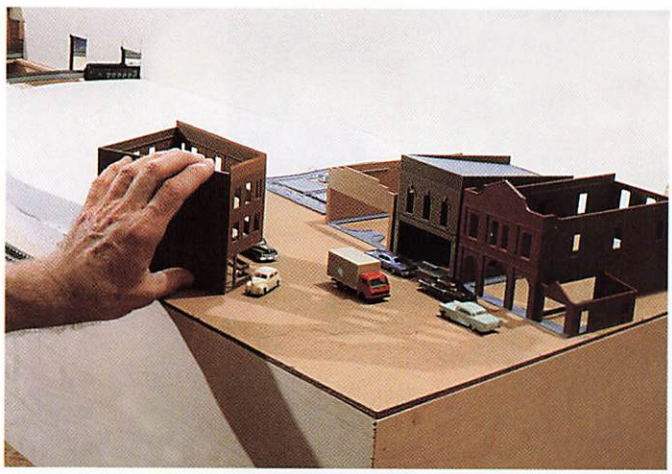
pastel chalk. Sprinkle fine earth-colored ground foam around the bases of any buildings that are resting on "dirt," so the building looks like it is resting in, not on, the layout.

Vehicles & People

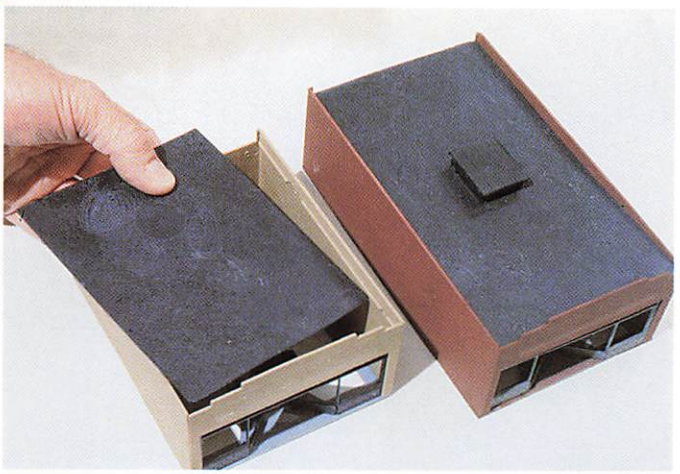
Your hobby retailer can order literally hundreds of ready-to-roll vehicles and nearly a thousand different people. There are also several dozen vehicles that are available as clear plastic or clear resin kits that you can assemble and paint. We used ready-to-roll vehicles on this layout, and the figures are all from Bachmann. Each figure, however, was modified by removing its base. Use a sharp hobby knife to slice the base from the figure, just at the soles of the feet. If you support the feet by resting the heels on a block of wood, the process is surprisingly easy. Attach the figures with a small dab of rubber cement so you can slice them free with a hobby knife if you want to later move them.



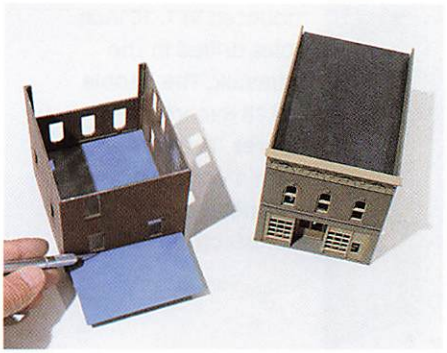
Paint the windows and doors while they are still attached to the molding sprue. Use a hobby knife to cut each part from the molding sprue.



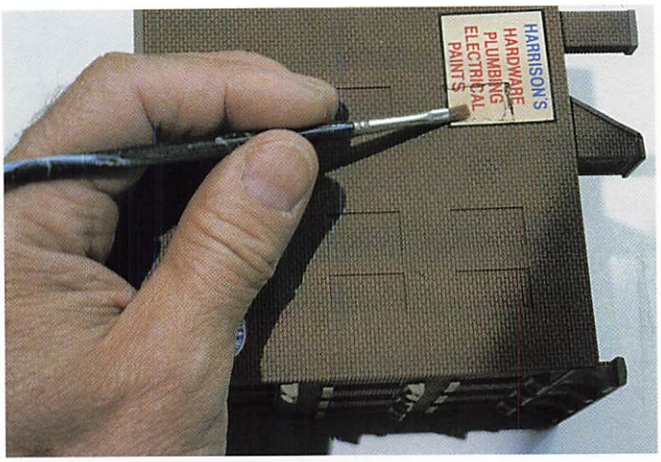
Assemble the bare walls of the buildings with clear plastic tape so you can position them on the layout to see where each building will fit and if any of them need to be cut to fit the available space.



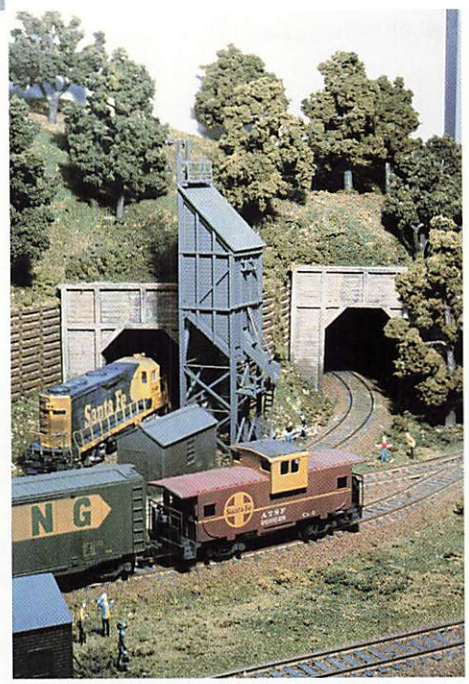
We used two each of some *Bachmann-Plus* buildings. This one was shortened using a razor saw to remove two inches from the side walls and a matching amount from the floor.



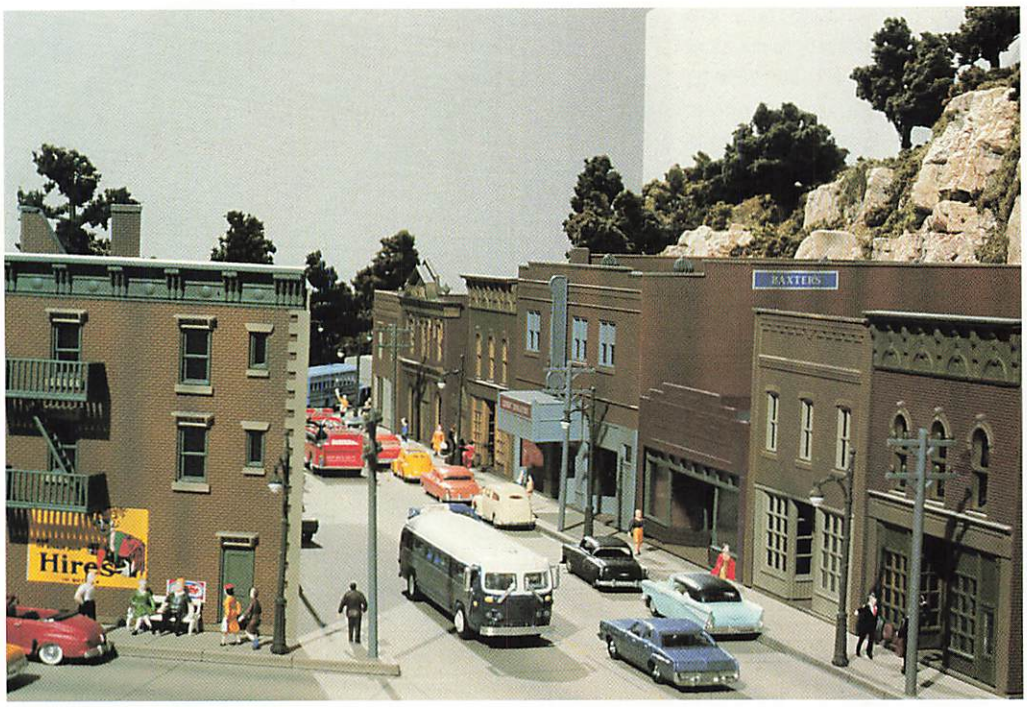
If you shorten a building, do not cut the roof until the walls and floor are assembled. Test-fit the roof and mark where to make the cut, then cut it with a razor saw.



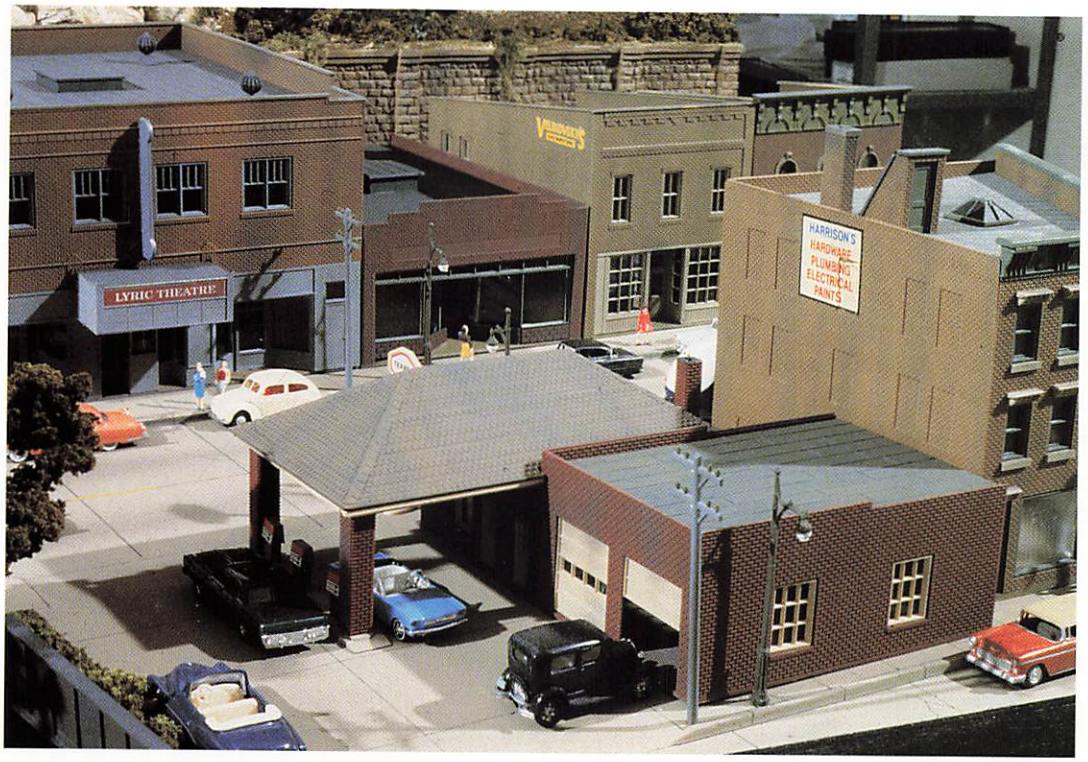
When you use decal signs, coat the decal with Microscale's Microsol decal-softening fluid so the decal will soften and snuggle in around the bricks to have a painted-on appearance.



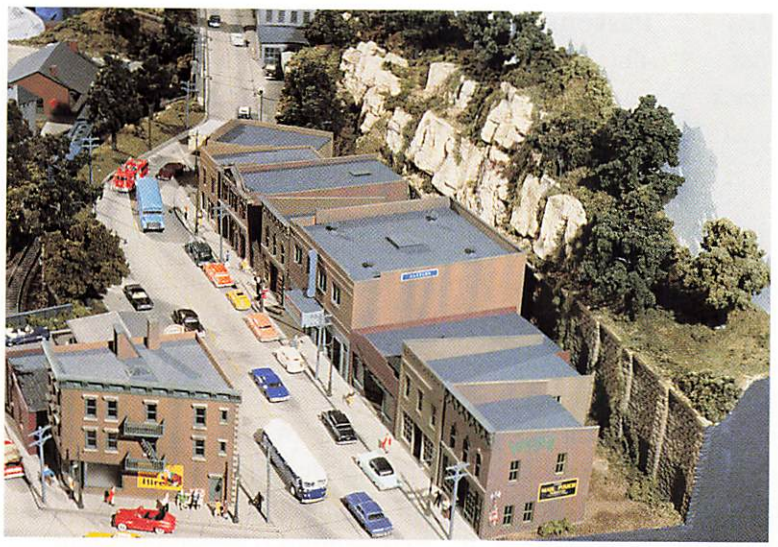
Do not install the shed or sand tower when assembling the *Bachmann-Plus* Sand & Coaling Tower Complex (Item No. 35111). The main structure can then serve as a mine. The Hoist House from the kit is being used as the station for this mining town.



Bachmann telephone poles have been modified by cutting off 1/8 inch from each end of the cross arms. The poles are mounted in 1/8 inch holes drilled in the sidewalk. The lights are Woodland Scenics cast metal parts, mounted in 1/16 inch holes drilled in the sidewalk. The people are all Bachmann figures. The cars are from a variety of European model manufacturers.

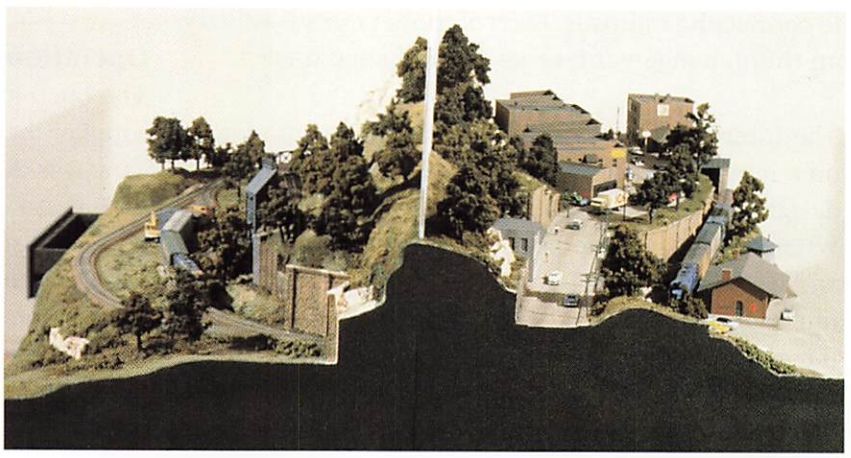


This Bachmann-Plus gas station has been modified so it can rest on the sidewalk without its own base.



The joints, cracks, white lines and stains of the streets are most apparent in this aerial view of the city section of the layout.

The finished layout, with the city scene on the right of the sky backdrop, and the country view on the left.



Chapter XV

Real Railroad Operations

There is plenty of space, even on a 2 x 6 foot shelf or a 4 x 6 foot tabletop model railroad, to duplicate the operations of real railroads. Each of the three track plans that are presented in Chapter 2 include some re-creation of a particular type of real railroad operation.

One of the advantages of E-Z Track is that it provides an opportunity for you to actually try different kinds of operation before you settle on a final layout. We would recommend that you build the benchwork as shown in Chapter 3, but at first add only the flat tabletop described in Chapter 4. Use the tabletop to try all three of the track plans. Go ahead and complete the wiring for two or three trains that's shown in Chapter VI so you really can operate each layout to its full potential. Then, after actually trying each type of operation, pick the plan that you enjoy the most and finish the layout as shown in Chapters VII through XIV.

Interchange Operations

Most real railroads are really just a link on a vast railroad transportation chain. One railroad could receive a car from another railroad, and deliver it to a customer on its line. However, a major portion of real railroad traffic is "bridge" or "through" traffic; carloads that are given to the railroad by another railroad and then delivered to a third railroad. In either case, the railroad has some place where it receives cars and other places where it delivers cars to connecting railroads. Each of those points is called an "interchange yard" or an "interchange track."

The interchange operations are simple to simulate on a model railroad. All you need is a siding designated (in your mind) as an "interchange track." When the locomotive pushes a car into that siding and leaves it, the car is assumed to have traveled off line to another railroad. In reality, you simply pick the car up and place it on a shelf or in a box for storage. To receive cars from other railroads, simply place a car on the "interchange track."

The process of interchange traffic can even extend to locomotives and, in fact, to entire trains. The 30 degree crossing in Plan 3 was included especially with an interchange in mind. One track leads right off the edge of the table to force the illusion that trains do go somewhere. Further, we've placed an interlocking tower there to suggest that trains from two railroads cross at that point. There's a similar crossing on Plan 1. Sure, you're simply adding equipment to the railroad (or removing it) like you always have, except now you have a real world reason for doing so.

Passenger Operations

There's room on these 4 x 6 foot layouts for short passenger trains to operate. There's a brick passenger station on the city side of the project layout with a small shed on the other side of the layout that would serve as a waiting room for miners. Amtrak Superliner cars would look a bit out of place on such tight curves, but the scale 60 to 72-foot cars based on Amtrak prototypes from the 1960s, streamlined cars from the 1940-1960 era, simulated steel-side cars from the 1910-1950 era and the open platform cars from the pre-1910 era all would be appropriate for this layout. To simulate long distances, just use the old trick of letting the train circle around the oval for a half-dozen laps between station stops.

Operations with Loaded Cars

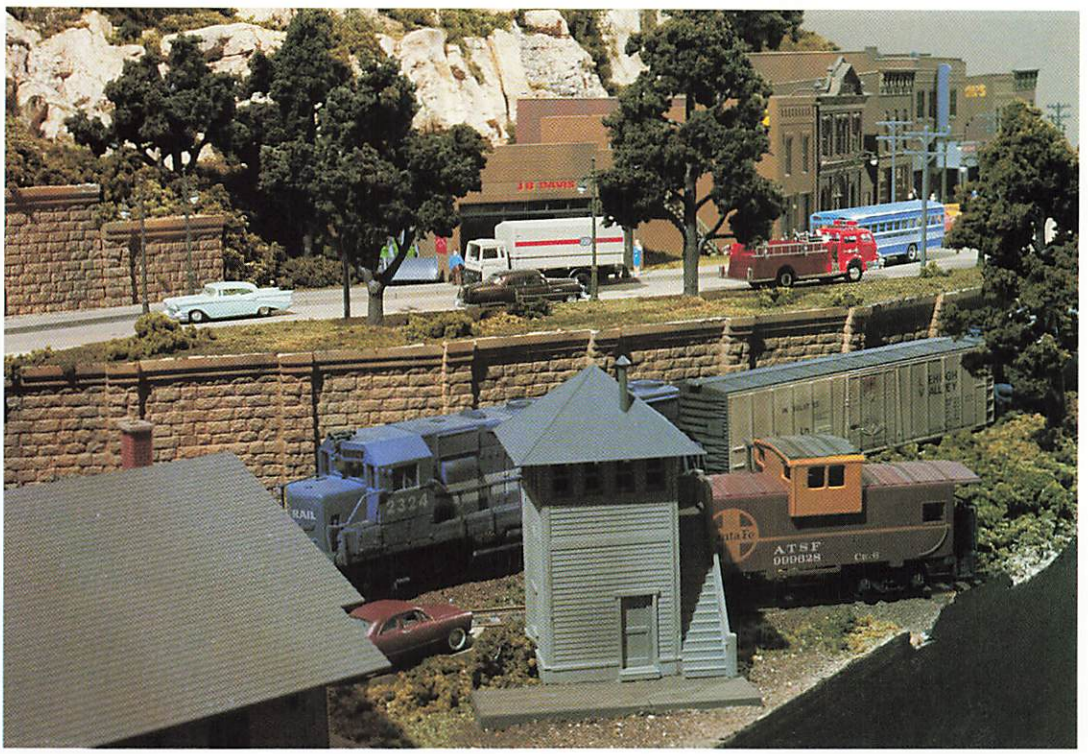
The open top gondolas, hoppers and flat cars are some of the more interesting real railroad freight cars. It is difficult to achieve realistic operations with these cars when you push a hopper car loaded with coal, for example, beneath a mine tipple. How much more realistic it would be if you could always push an empty car beneath that tipple and, even better, pick up a loaded car one "day" later.

You can simulate that type of operation with a track arrangement called "loads-in, empties-out." One is included in Plan 3 on tracks B and C. Both tracks lead into tunnels behind a mine on one side of the layout. Both tracks emerge from beneath an industry on the opposite side of the layout. The system works like this: empty cars are pushed into the mine on track B. After about the fifth car is pushed into the mine, the first car will pop out of the opposite side of the layout. At that point the "empty" track is full. Loaded cars of ore are delivered to the grey mill on the "city" side of the layout. Again, after about the fifth loaded car, the first car will pop out near the mine on the opposite side of the layout. The next train that comes by can then pickup a loaded car at the mine to be delivered to the mill on the opposite side.

There's a slight variation on the scheme on this particular layout. The empty cars go off line (off the layout table to a storage shelf) at B to another railroad. Hence, you must remove the empties by hand and place them on a shelf or back on the mainline. If you want to keep all the loads and empties traffic on the layout, simply replace the 30 degree crossing with a single right-hand switch.

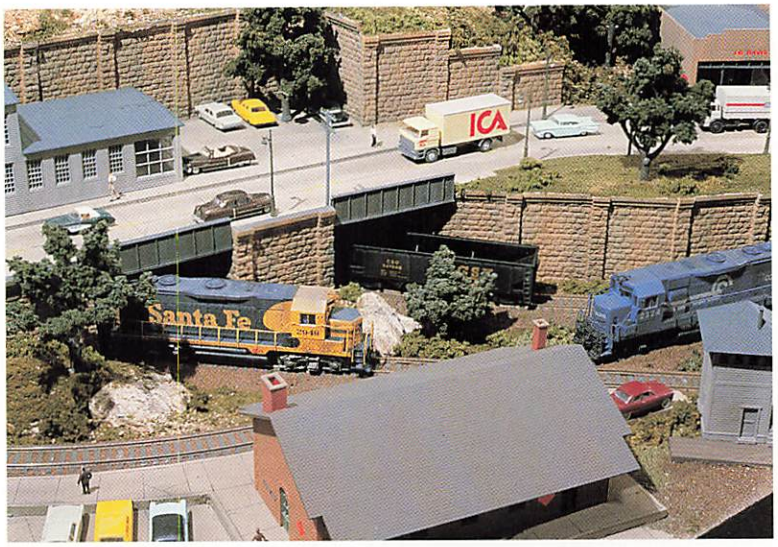
Plan the shipping and receiving industries as logical pairs. On the project layout there's an ore mine shipping to a mill. Other pairs could include a coal mine and power plant, a gravel quarry and a cement plant or a scrap metal dealer and a foundry. Usually, the receiving industry will ship the "finished" product in some other type of car. The mill on the project layout would probably ship out box car loads of ingots, for example.

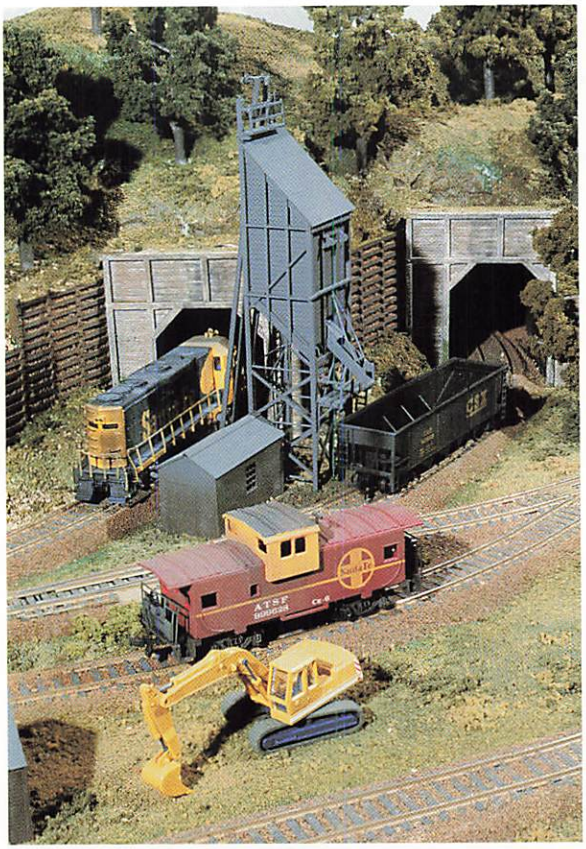
The touchstone of operations on a model railroad is imagination, coupled with a knowledge of why and how real railroads operate. An operating model railroad, like the one on these pages, provides the stage where you can recreate the actions and appearance of most real railroads from any era!



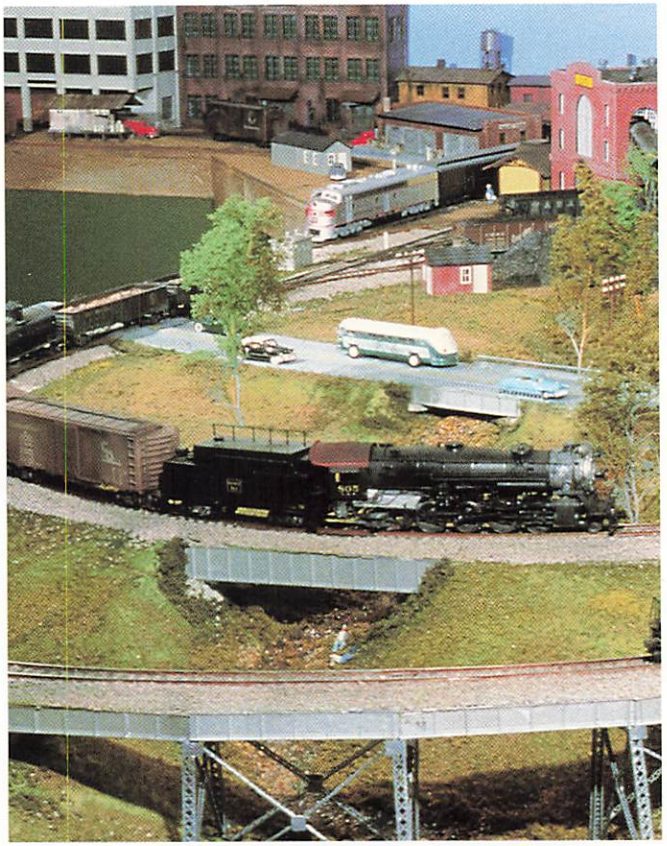
The Santa Fe caboose sitting on the interchange track suggests that an entire train has just arrived on the layout from somewhere in the outside world.

Use your imagination: the grey mill in the upper left ships and receives receives ore in bunkers beneath the building. The black hopper has just been unloaded and is awaiting pickup. The Santa Fe diesel has just pushed a loaded ore car into the bins.





Meanwhile, on the other side of the layout.... An empty car is waiting at the ore tipple to be filled while the Santa Fe diesel reaches into the tunnel for a loaded ore car. The mine/mill operations are a "loads-in, empties-out" pair of industries.

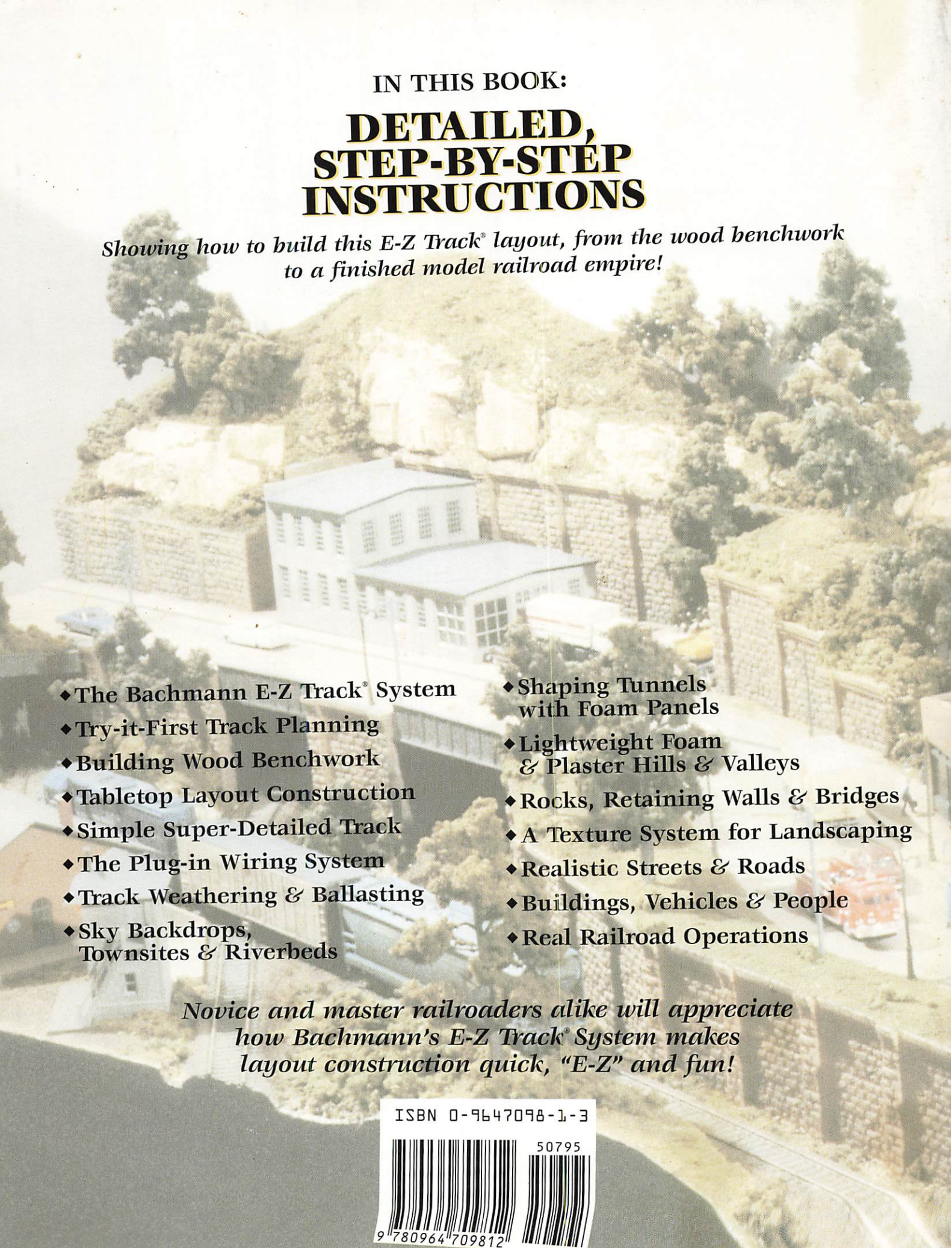


You can use the sturdy 2 x 8-foot sheets of 2-inch thick extruded-polystyrene insulation board for both the table and the scenery shapes. The blue-colored Dow-Corning Styrofoam is the most commonly available, but there are similar products. The white expanded-polystyrene insulation or "beard board" is too soft for this purpose and the urethane boards are difficult to cut. This 4 x 8-foot layout was built using this system and its construction is featured, step-by-step, in THE HO MODEL RAILROADING HANDBOOK, also by Robert Schleicher, published by Krause Publications (700 E. State St., Iola, WI 54990-0001). It utilizes E-Z track and is an expansion of the double-tracked oval, Plan 2, in this book, to 4 x 8-feet with a 1 x 3-foot extension to make a 7 x 8-foot layout. Note that there is no sky backdrop down the center of this layout, the mine and the powerplant are hidden from one another by a low hill and a thick woods.

IN THIS BOOK:

DETAILED, STEP-BY-STEP INSTRUCTIONS

Showing how to build this E-Z Track® layout, from the wood benchwork to a finished model railroad empire!



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